Seminari 13

Matematičke metode za informatičare

Damir Horvat

FOI, Varaždin

Sadržaj

prvi zadatak

Zadatak 1

Zadana je funkcija $f(x, y) = \ln\left(x + y^2\right)$.

a) *Prikažite grafički domenu funkcije* f.

b) *Odredite nivo-linije funkcije* f *i specijalno nacrtajte nivo-liniju za vrijednost* $z = \ln 5$.

c) *Odredite nultočke funkcije* f.

d) *Odredite parcijalne derivacije funkcije* f.

e) *Odredite* $\dfrac{\partial^4 f}{\partial x^3 \partial y}$.

a) **Rješenje**

$$\boxed{f(x,y)=\ln\left(x+y^2\right)}$$

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$$\boxed{f(x,y)=\ln\left(x+y^2\right)}$$

$$x+y^2>0$$

a) Rješenje

$$\boxed{f(x, y) = \ln\left(x + y^2\right)}$$

$$x + y^2 > 0$$

$$y^2 > -x$$

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crtamo krivulju

$$y^2 = -x$$

a) **Rješenje**

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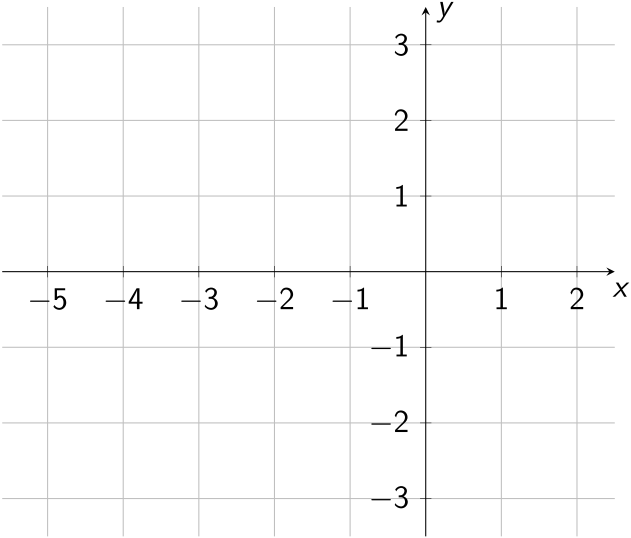

$$x+y^2>0$$

$$y^2>-x$$

crtamo krivulju

$$y^2=-x$$

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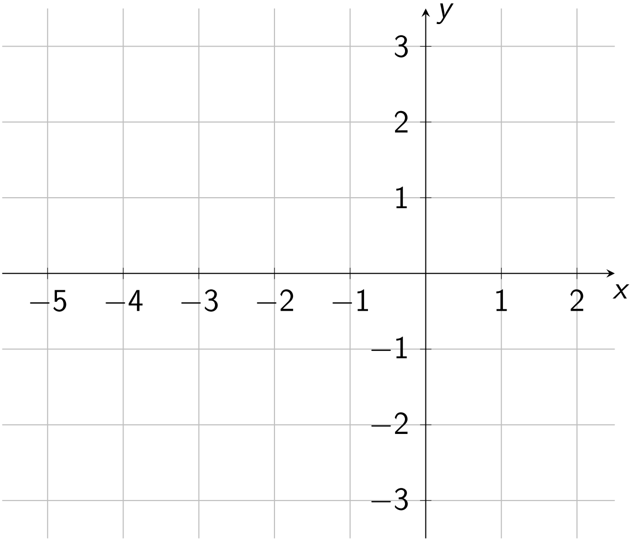

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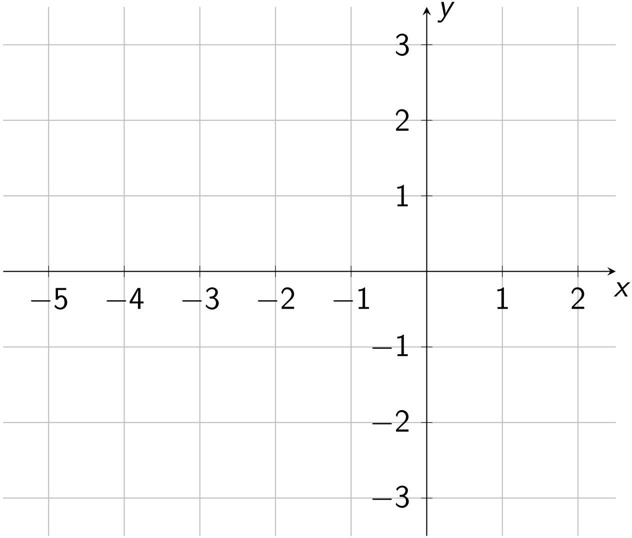

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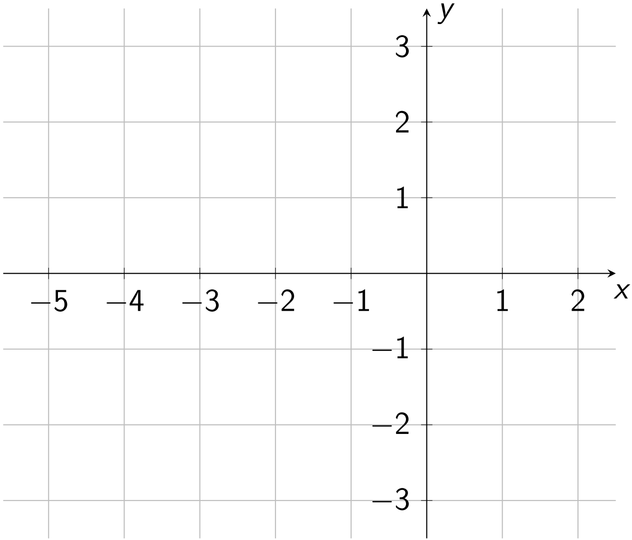

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$$\begin{tikzcd} y^2=-x \arrow[d, squiggly] \\ x=-y^2 \end{tikzcd}$$

y	-2				
x					

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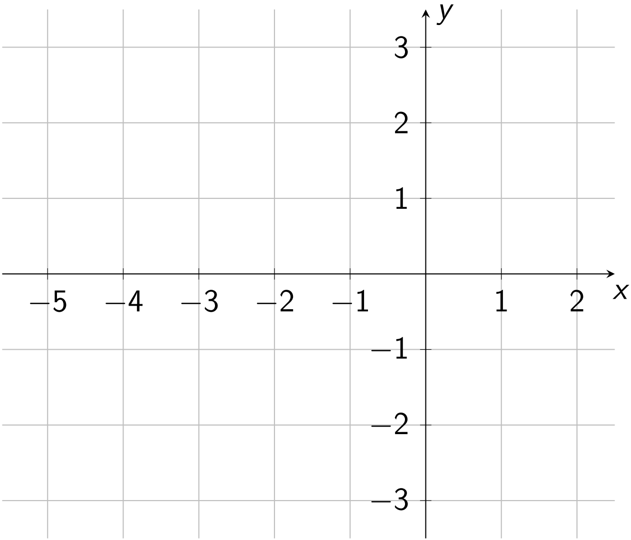

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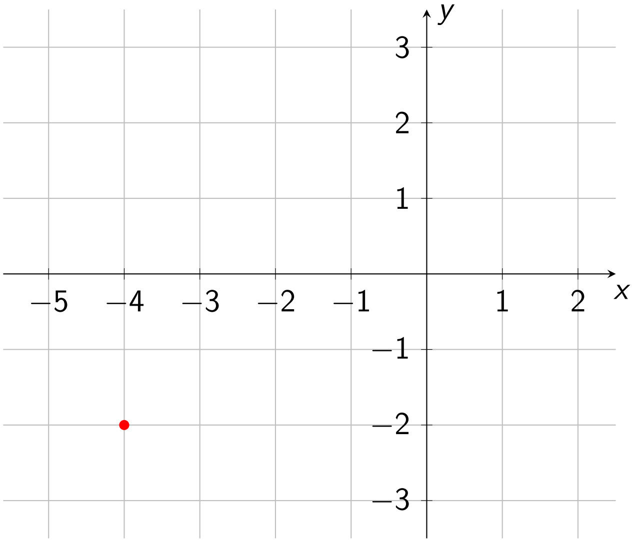

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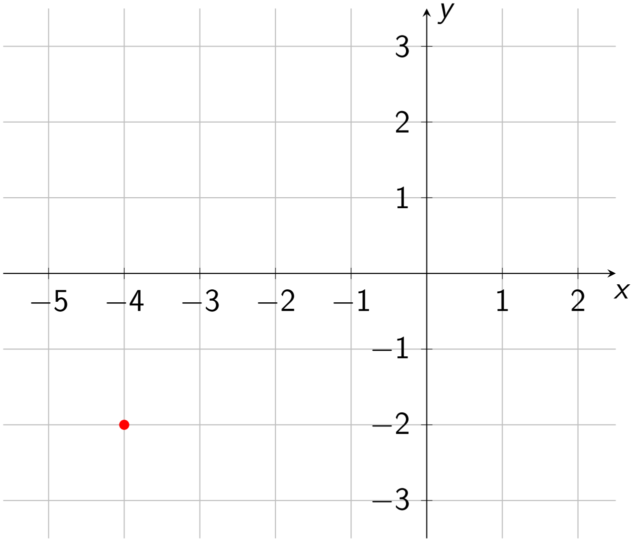

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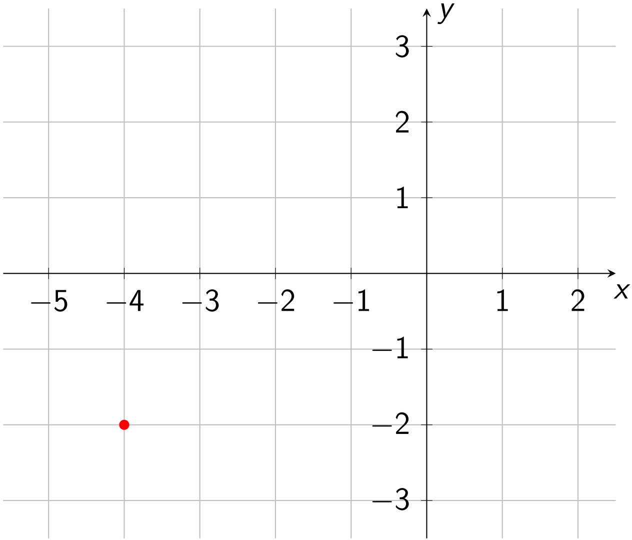

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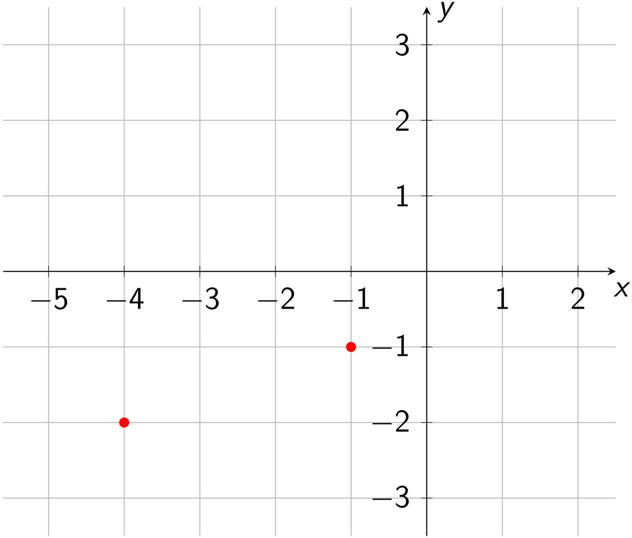

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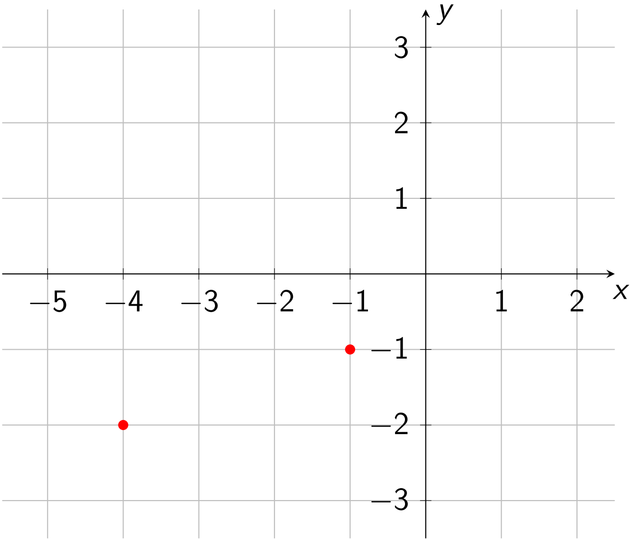

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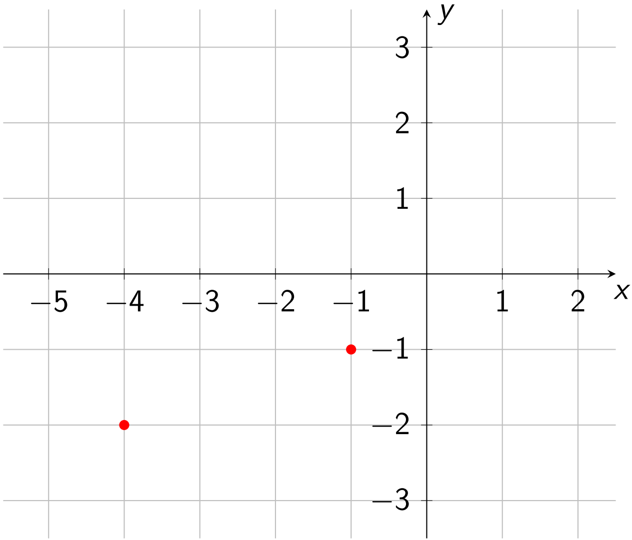

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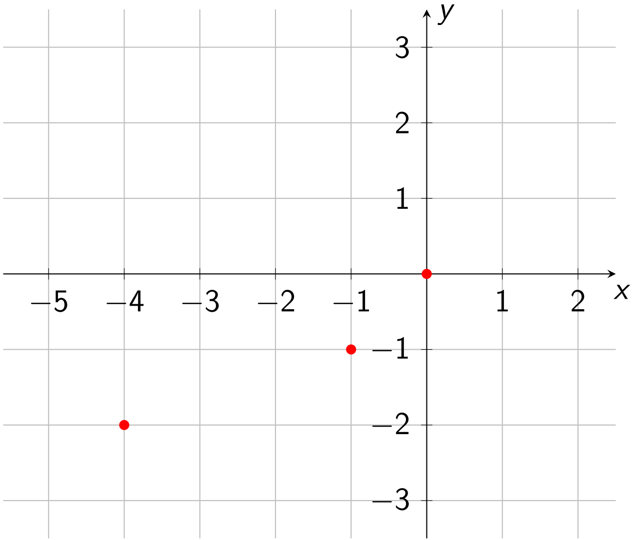

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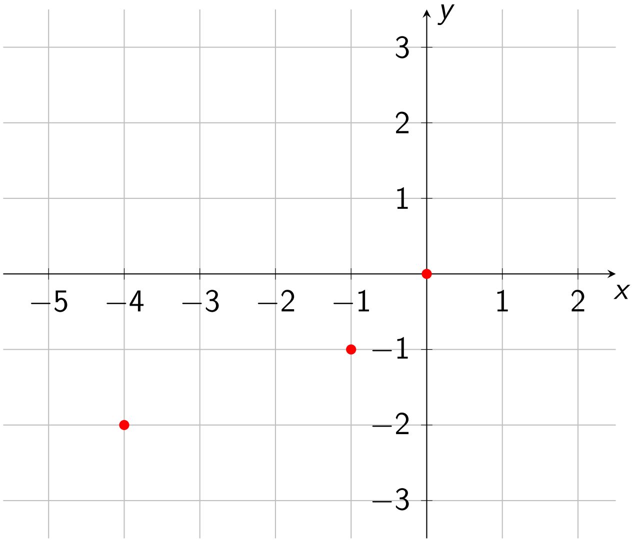

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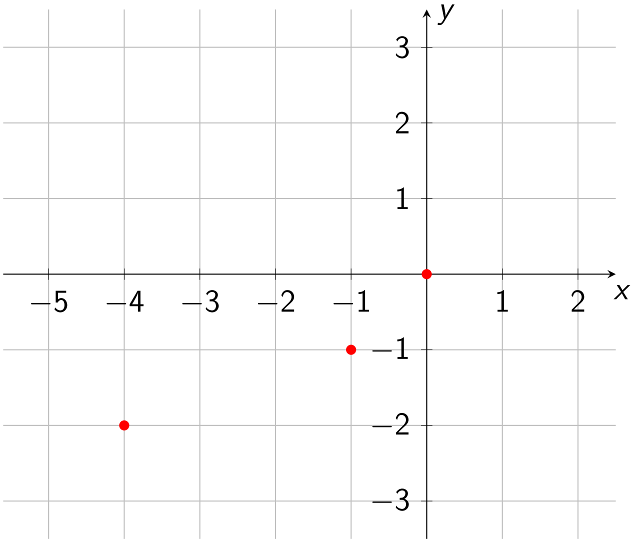

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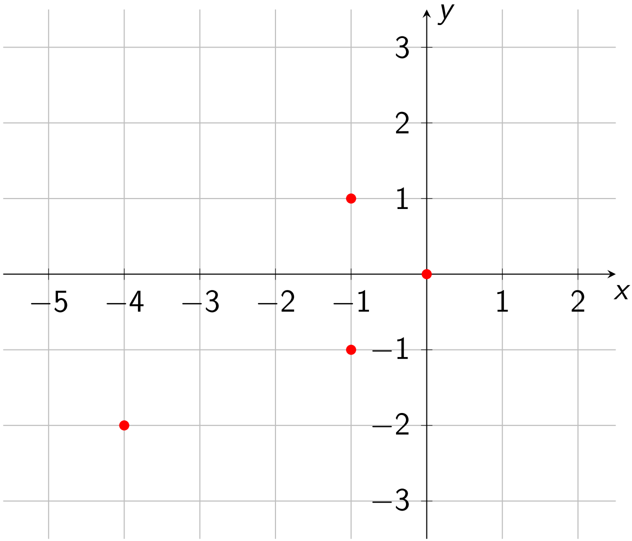

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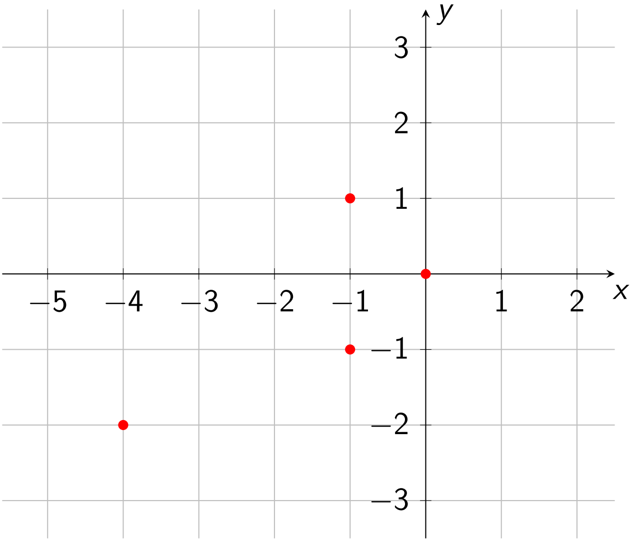

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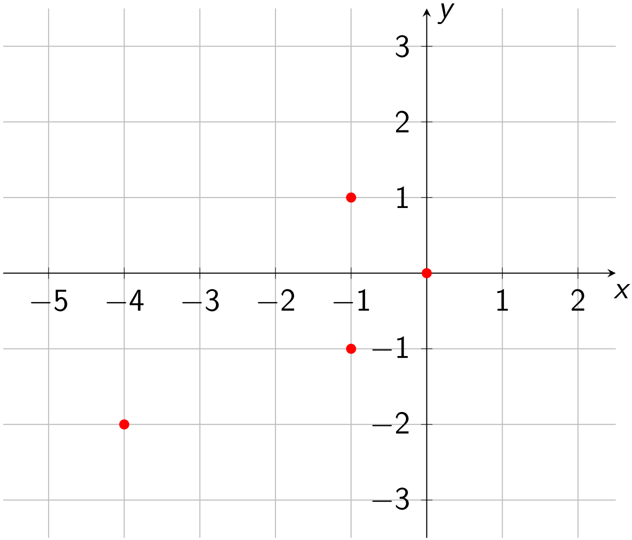

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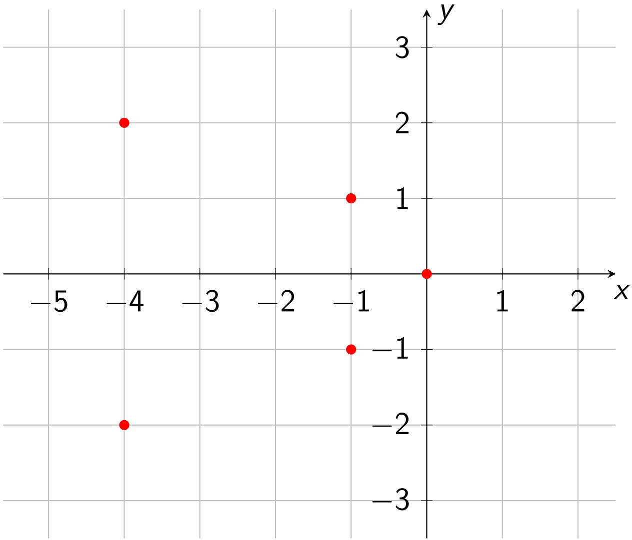

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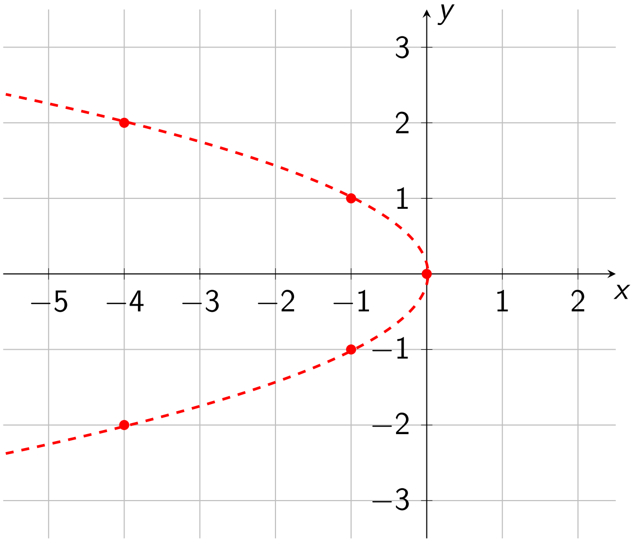

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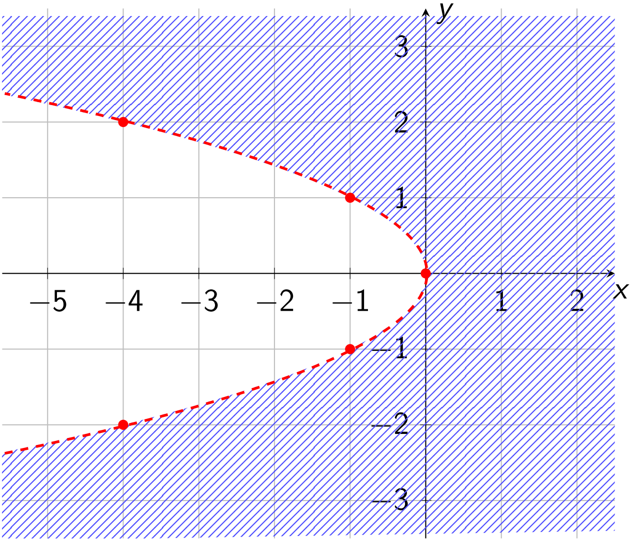

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nivo-linije
su parabole

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nivo-linije
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$$\boxed{C = \ln 5}$$

b)

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nivo-linije
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$$\boxed{C=\ln 5}$$

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b)

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nivo-linije
su parabole

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$$y^2 = -x + e^{\ln 5}$$

$$\boxed{a^{\log_a x} = x}$$

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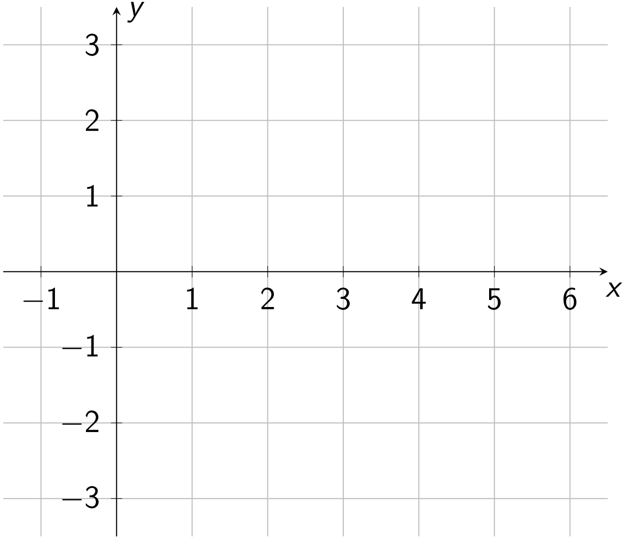

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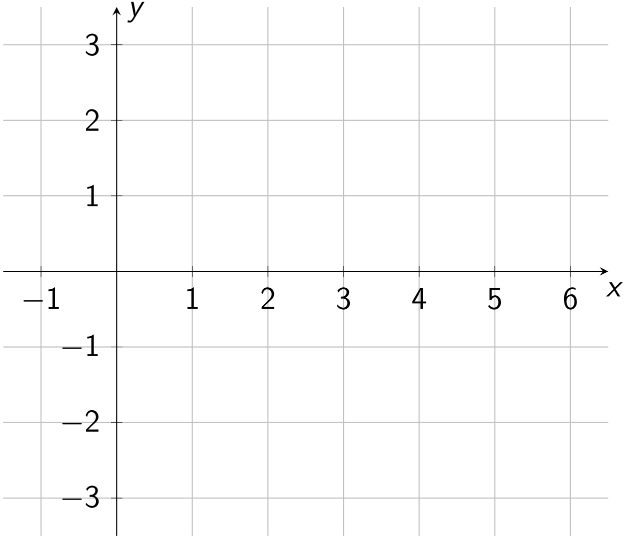

y				
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nivo-linije
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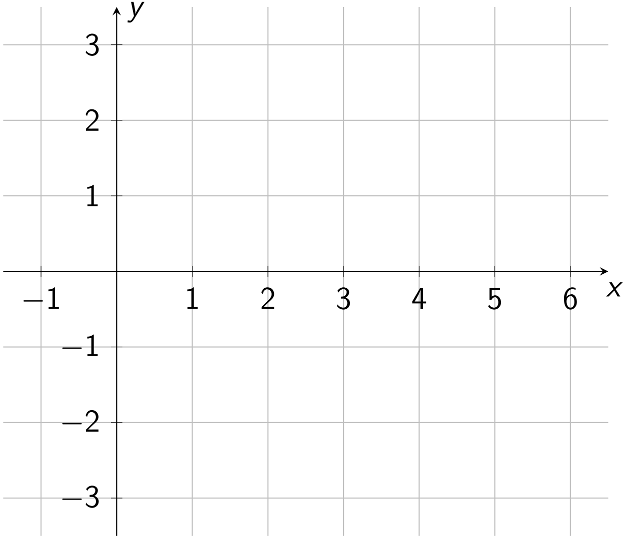
$$\boxed{C=\ln 5}$$

$$y^2=-x+e^{\ln 5}$$

$$\boxed{y^2=-x+5}$$

$$x=5-y^2$$

b)



y	-2				
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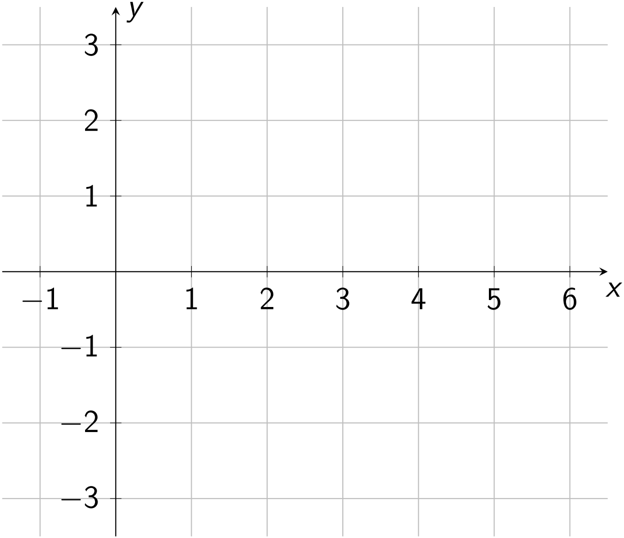

y	-2				
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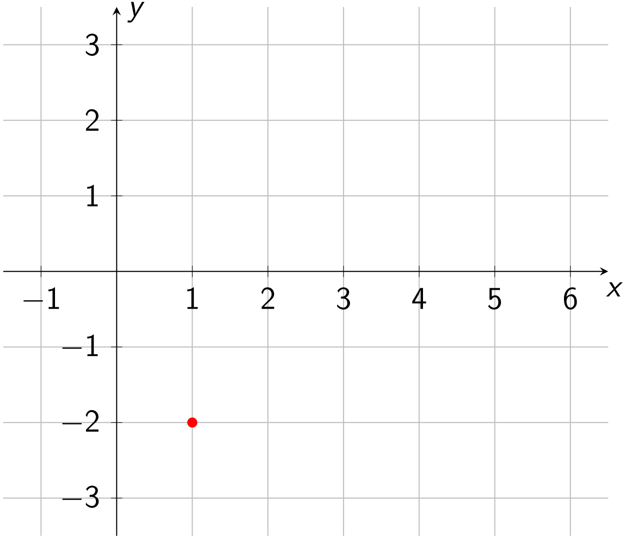

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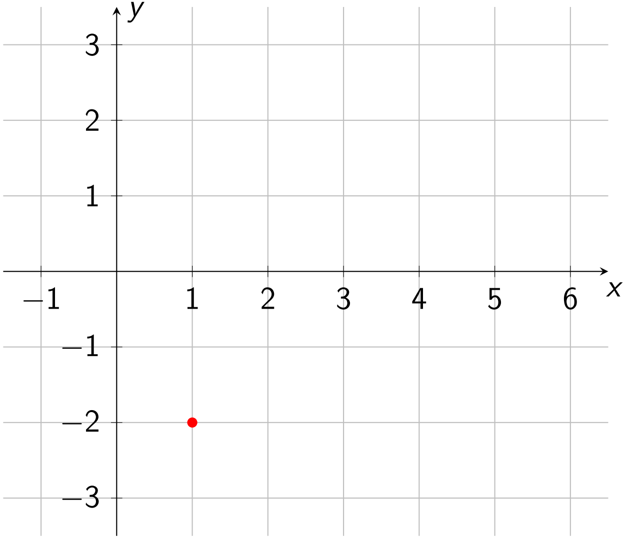

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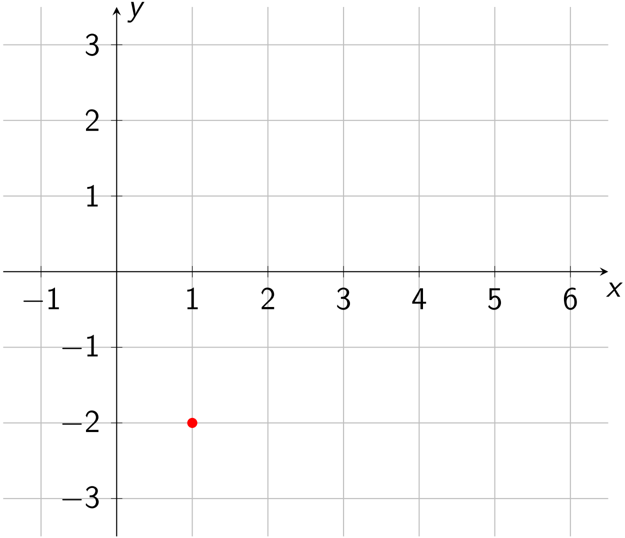

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nivo-linije

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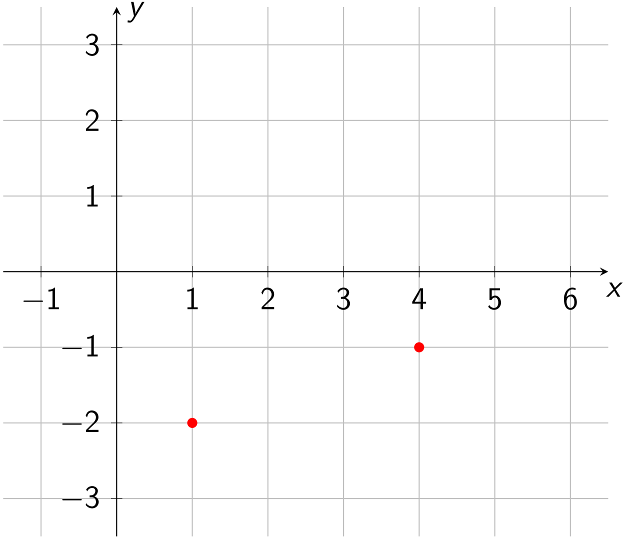

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$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nivo-linije

su parabole

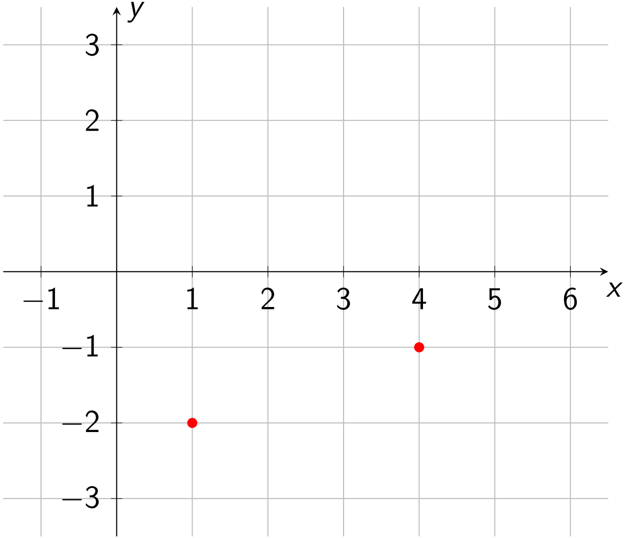
$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

$$\boxed{y^2 = -x + 5}$$

$$x = 5 - y^2$$

b)



y	-2	-1	0		
x	1	4			

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nivo-linije
su parabole

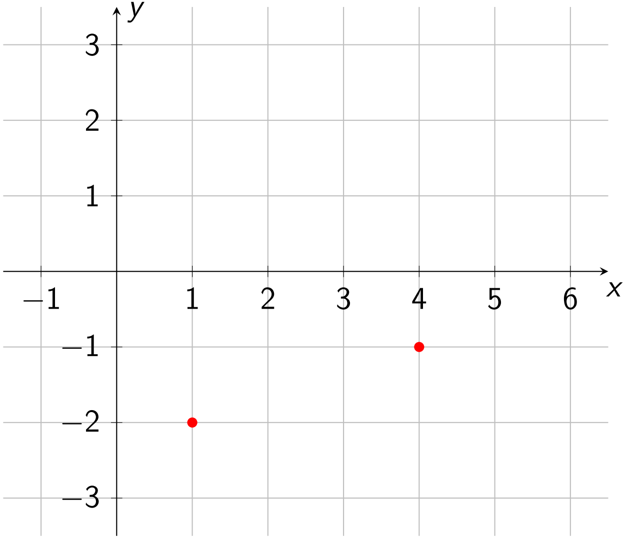
$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

$$\boxed{y^2 = -x + 5}$$

$$x = 5 - y^2$$

b)



y	-2	-1	0		
x	1	4	5		

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nivo-linije

su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

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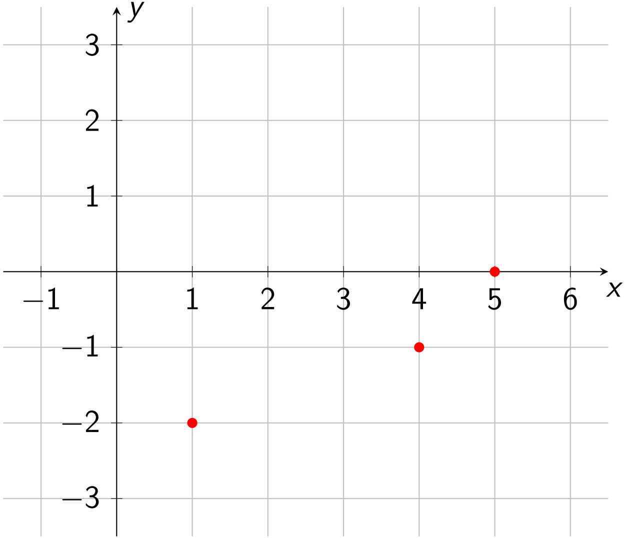
$$x = 5 - y^2$$

b)



y	-2	-1	0		
x	1	4	5		

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

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nivo-linije

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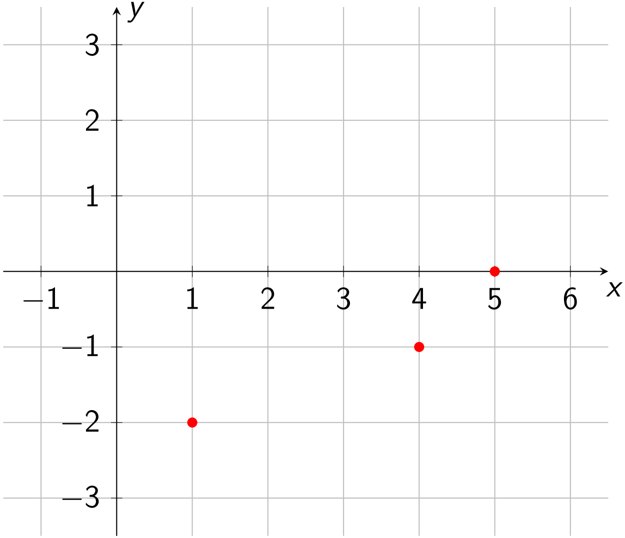
$$x = 5 - y^2$$

b)



y	-2	-1	0	1	
x	1	4	5		

$$\boxed{f(x,y) = \ln\left(x+y^2\right)}$$

$$\ln\left(x+y^2\right) = C$$

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nivo-linije

su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

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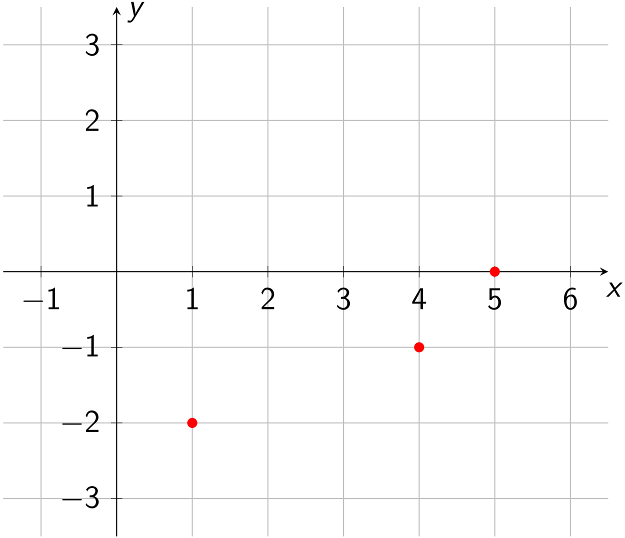
$$x = 5 - y^2$$

b)



y	-2	-1	0	1	
x	1	4	5	4	

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

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nivo-linije

su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

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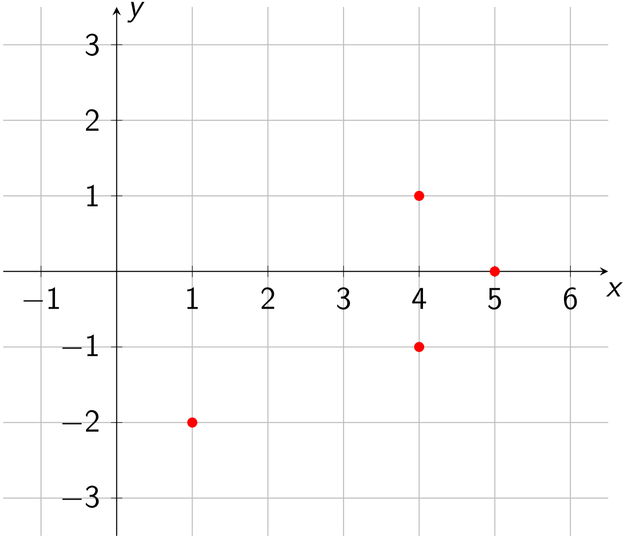
$$x = 5 - y^2$$

b)



y	-2	-1	0	1	
x	1	4	5	4	

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

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nivo-linije su parabole

$$\boxed{C = \ln 5}$$

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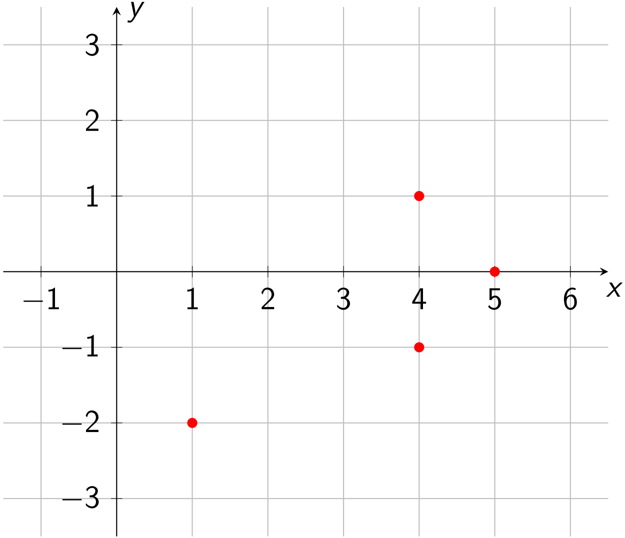
$$x = 5 - y^2$$

b)



y	-2	-1	0	1	2
x	1	4	5	4	

$$\boxed{f(x, y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

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nivo-linije
su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

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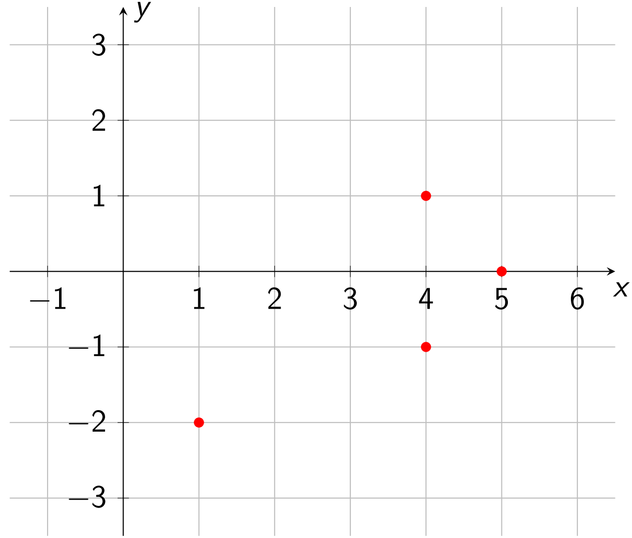
b)



y	-2	-1	0	1	2
x	1	4	5	4	1

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

$$y^2 = -x + e^C, \;\; C \in \mathbb{R}$$

nivo-linije
su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

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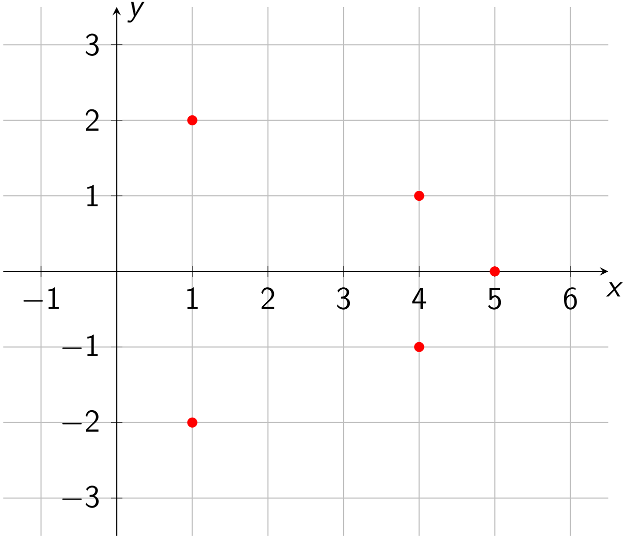
$$x = 5 - y^2$$

b)



y	-2	-1	0	1	2
x	1	4	5	4	1

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nivo-linije
su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

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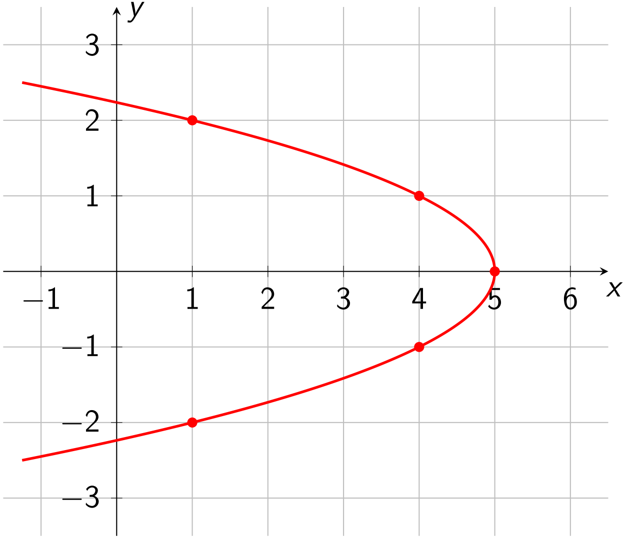
$$x = 5 - y^2$$

b)



y	−2	−1	0	1	2
x	1	4	5	4	1

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\ln\left(x + y^2\right) = C$$

$$x + y^2 = e^C$$

$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nivo-linije

su parabole

$$\boxed{C = \ln 5}$$

$$y^2 = -x + e^{\ln 5}$$

$$\boxed{y^2 = -x + 5}$$

$$x = 5 - y^2$$

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nultočke

c)

$$\boxed{f(x, y) = \ln\left(x + y^2\right)}$$

$$y^2 = -x + e^C,\ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$y^2 = -x + e^C,\ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$y^2 = -x + e^C,\ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$y^2 = -x + 1$$

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

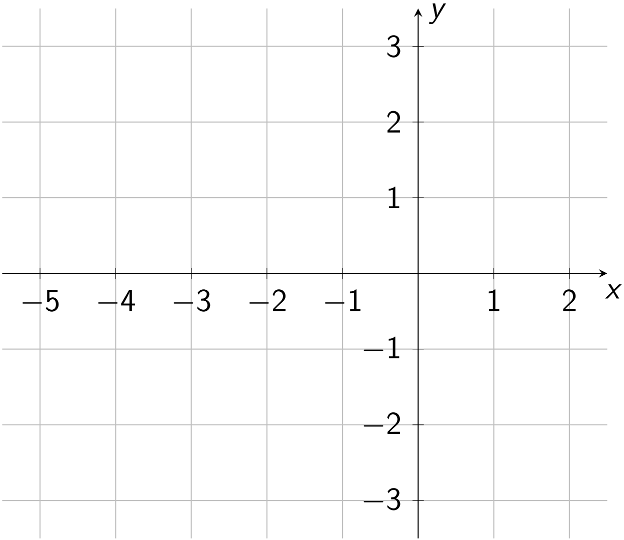
$$y^2 = -x + e^C, \; C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

c)



$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$y^2 = -x + e^C, \;\; C \in \mathbb{R}$$

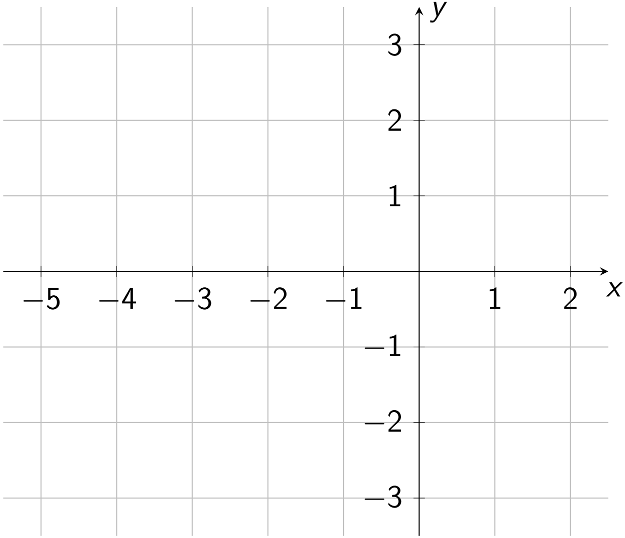
nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \quad C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

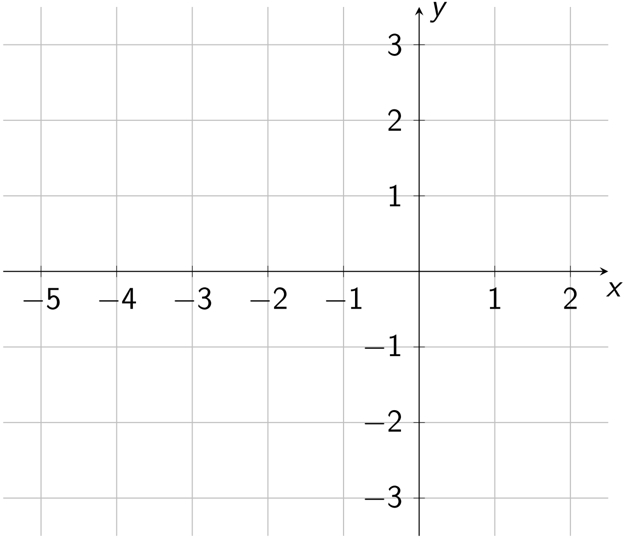
$$\rightsquigarrow$$

$$x = 1 - y^2$$

y					
x					

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

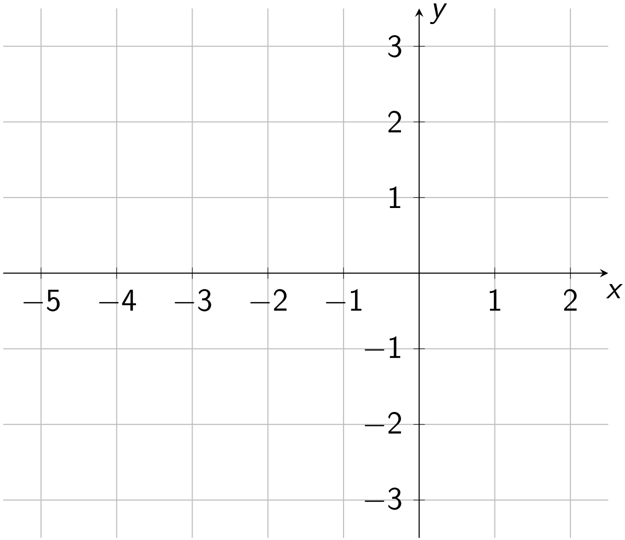
$$\Big\downarrow$$

$$x = 1 - y^2$$

y	-2				
x					

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \;\; C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

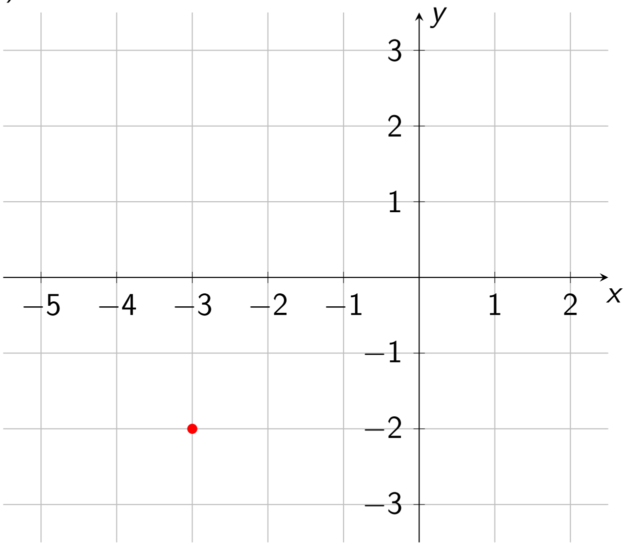
$$\rightsquigarrow$$

$$x = 1 - y^2$$

y	-2				
x	-3				

c)

$$\boxed{f(x,y) = \ln\left(x+y^2\right)}$$



$$y^2 = -x + e^C, \quad C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

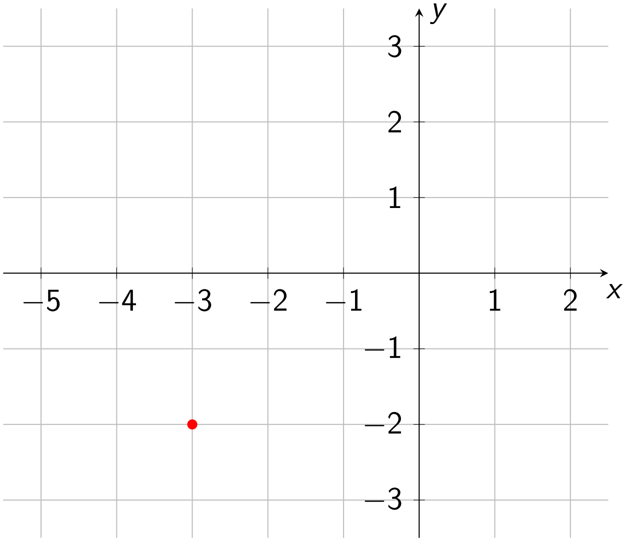
$$\rightsquigarrow$$

$$x = 1 - y^2$$

y	-2				
x	-3				

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \quad C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

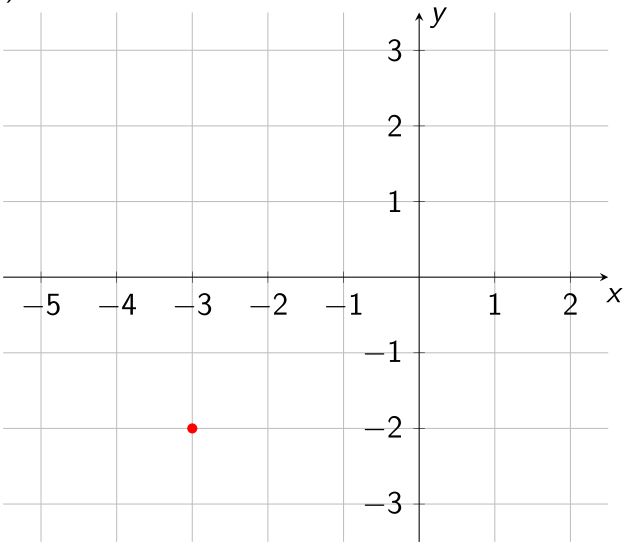
$$\rightsquigarrow$$

$$x = 1 - y^2$$

y	-2	-1			
x	-3				

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

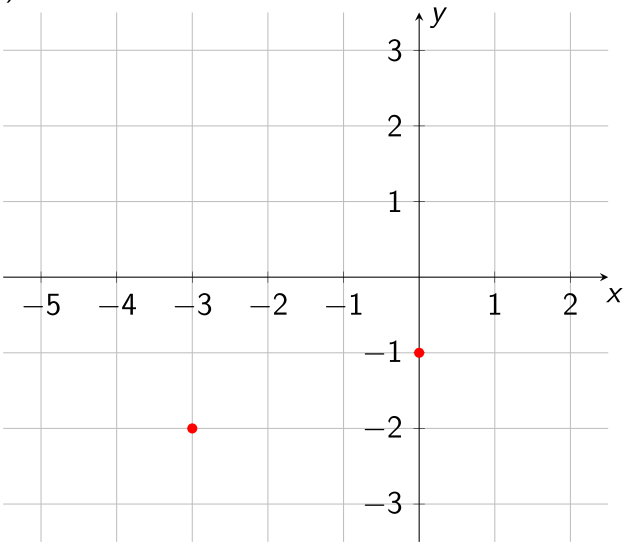
$$\rightsquigarrow$$

$$x = 1 - y^2$$

y	-2	-1			
x	-3	0			

c)

$$\boxed{f(x,y)=\ln\left(x+y^2\right)}$$



$$y^2=-x+e^C,\ \ C\in\mathbb{R}$$

nultočke $\boxed{C=0}$

$$y^2=-x+e^0$$

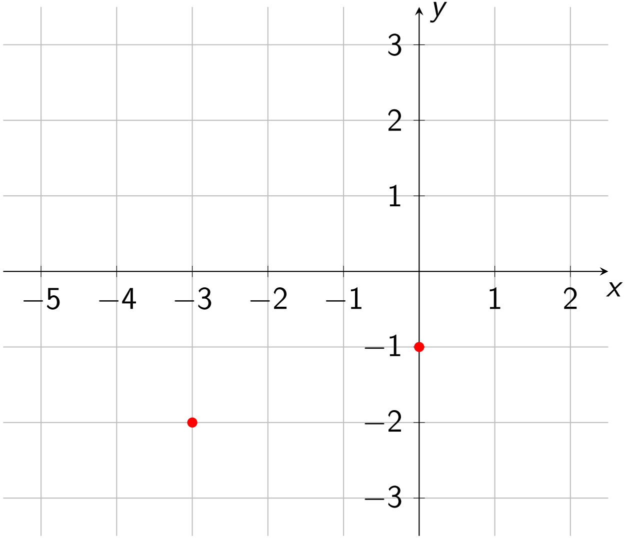
$$\boxed{y^2=-x+1}$$

$$x=1-y^2$$

y	-2	-1			
x	-3	0			

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \quad C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

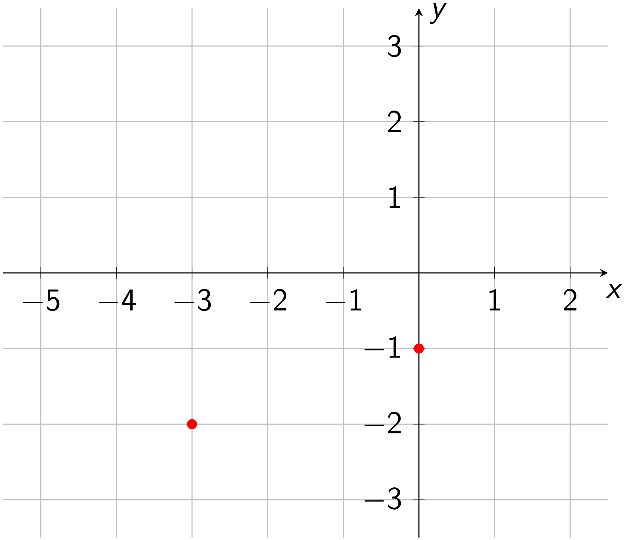
$$\boxed{y^2 = -x + 1}$$

$$x = 1 - y^2$$

y	-2	-1	0		
x	-3	0			

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \quad C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

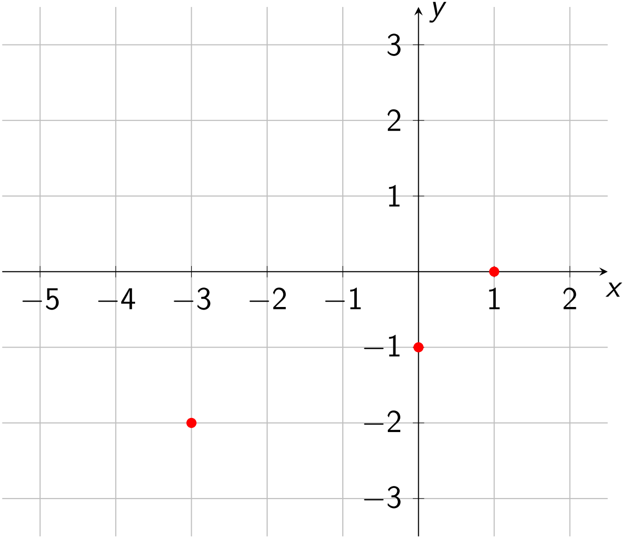
$$\rightsquigarrow$$

$$x = 1 - y^2$$

y	-2	-1	0		
x	-3	0	1		

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \;\; C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

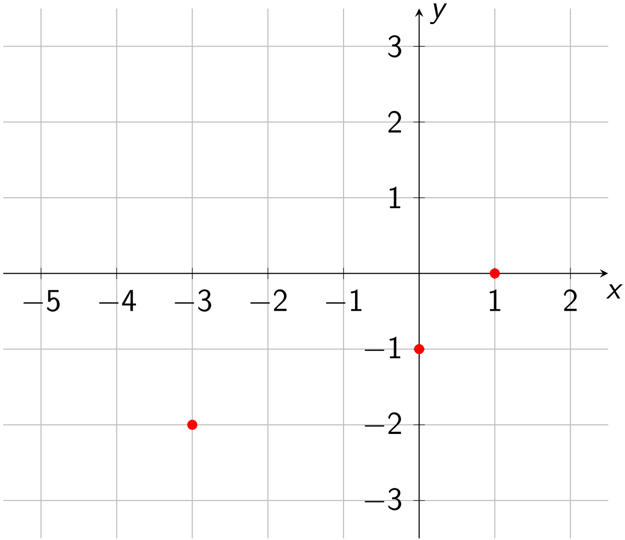
$$\boxed{y^2 = -x + 1}$$

$$x = 1 - y^2$$

y	-2	-1	0		
x	-3	0	1		

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



y	-2	-1	0	1	
x	-3	0	1		

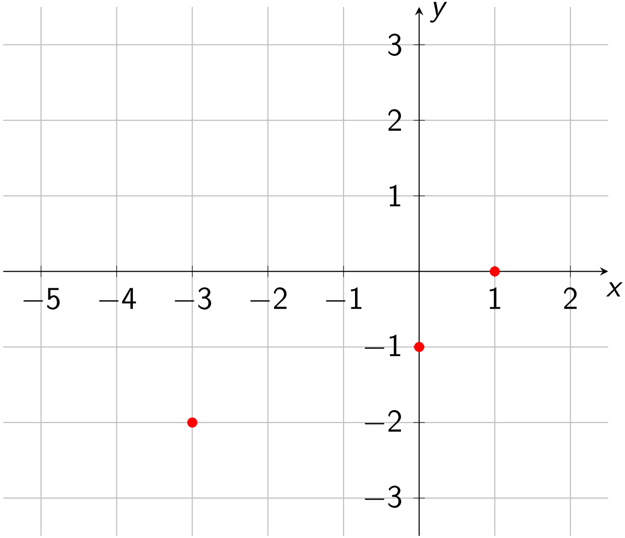
$$y^2 = -x + e^C, \ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

$$\begin{array}{c}\boxed{y^2 = -x + 1}\\ \rightsquigarrow \\ x = 1 - y^2\end{array}$$

c)



$$\boxed{f(x,y)=\ln\left(x+y^2\right)}$$

$$y^2=-x+e^C,\ \ C\in\mathbb{R}$$

nultočke $\boxed{C=0}$

$$y^2=-x+e^0$$

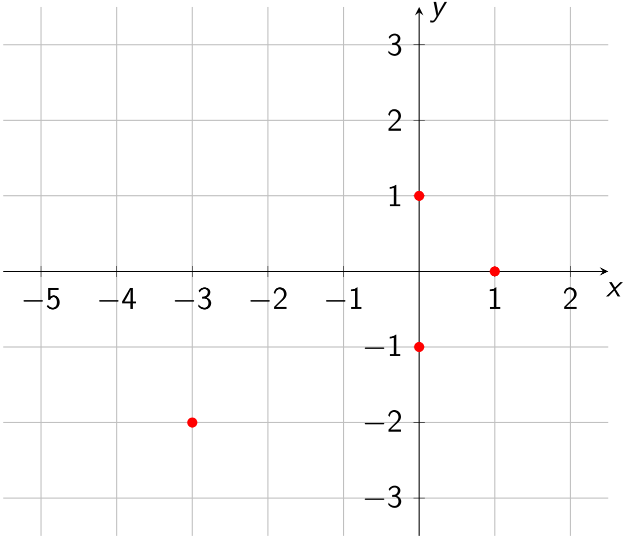
$$\boxed{y^2=-x+1}$$

$$x=1-y^2$$

y	-2	-1	0	1
x	-3	0	1	0

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \;\; C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

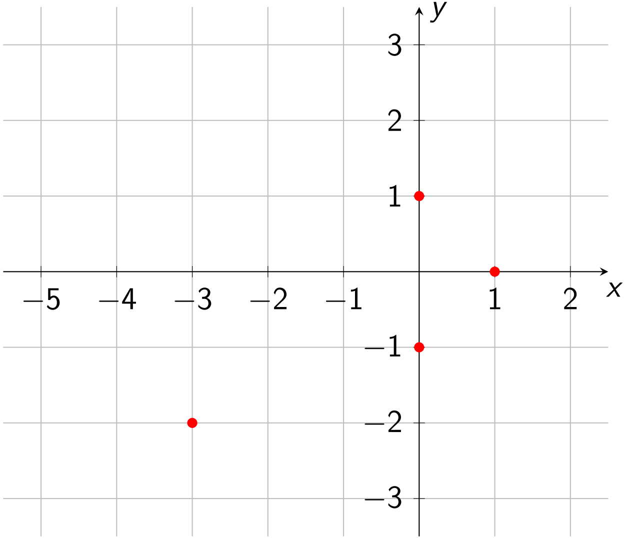
$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1} \rightsquigarrow x = 1 - y^2$$

y	-2	-1	0	1	
x	-3	0	1	0	

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \;\; C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

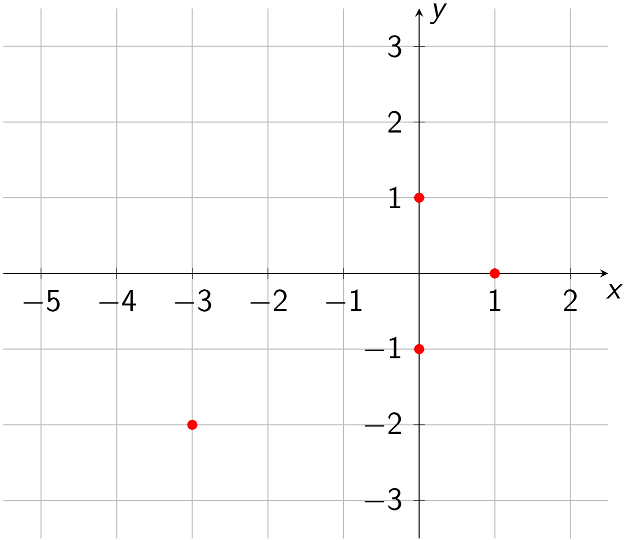
$$y^2 = -x + e^0$$

$$\boxed{y^2 = -x + 1}$$

$$x = 1 - y^2$$

y	-2	-1	0	1	2
x	-3	0	1	0	

c)



$$\boxed{f(x, y) = \ln\left(x + y^2\right)}$$

$$y^2 = -x + e^C, \ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

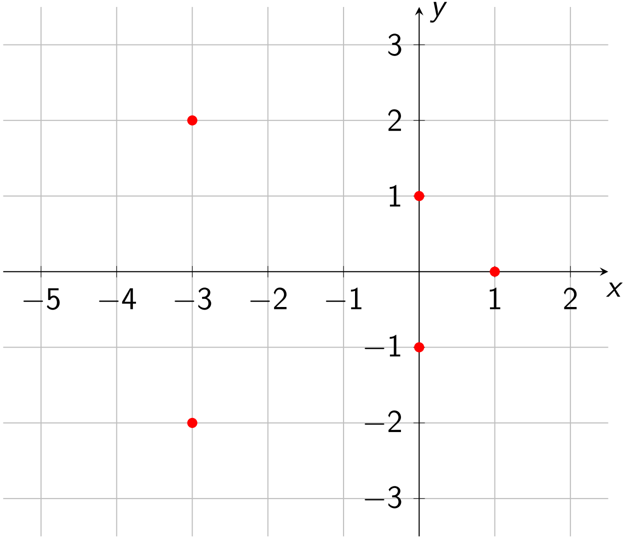
$$\boxed{y^2 = -x + 1}$$

$$x = 1 - y^2$$

y	-2	-1	0	1	2
x	-3	0	1	0	-3

c)

$$\boxed{f(x, y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

$$y^2 = -x + e^0$$

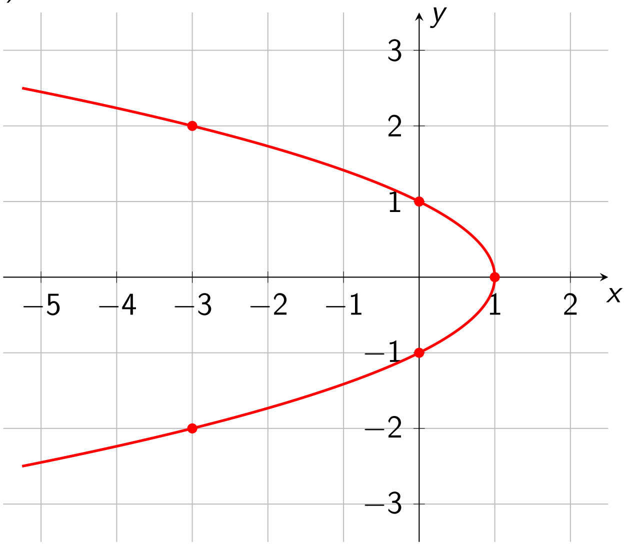
$$\boxed{y^2 = -x + 1}$$

$$x = 1 - y^2$$

y	-2	-1	0	1	2
x	-3	0	1	0	-3

c)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$



$$y^2 = -x + e^C, \ \ C \in \mathbb{R}$$

nultočke $\boxed{C = 0}$

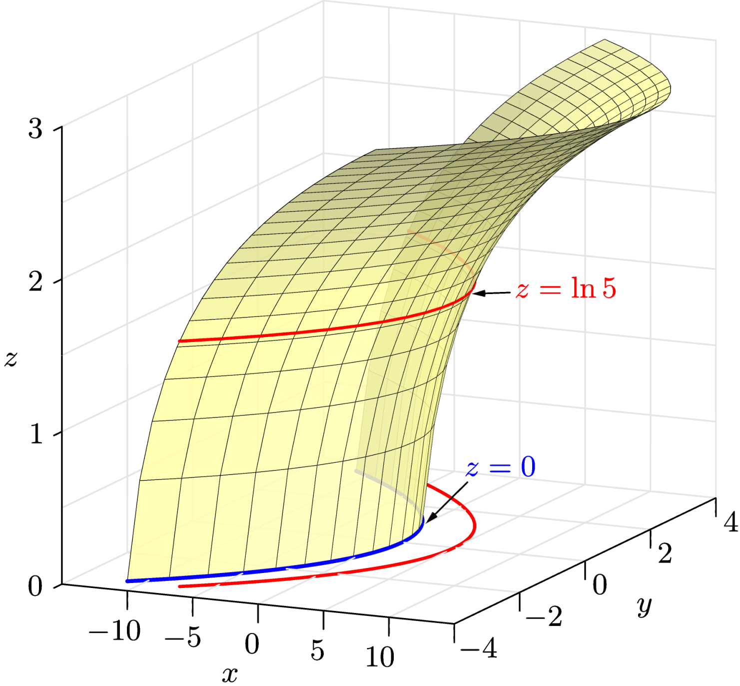
$$y^2 = -x + e^0$$

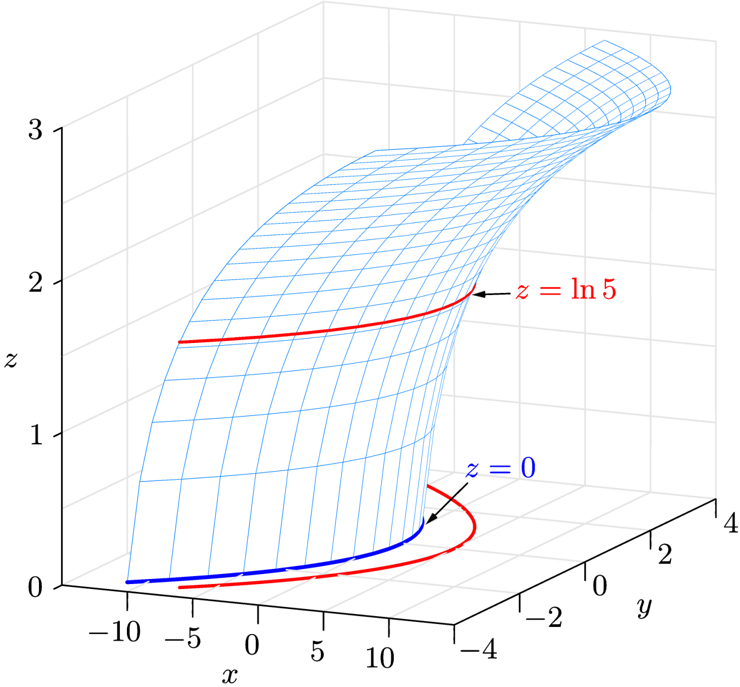
$$\boxed{y^2 = -x + 1}$$

$$\rightsquigarrow$$

$$x = 1 - y^2$$

y	-2	-1	0	1	2
x	-3	0	1	0	-3


3
2
1
0
z
−10
−5
0
5
10
x
−4
−2
0
2
4
y
$z = \ln 5$
$z = 0$


3
2
1
0
z
$z = \ln 5$
$z = 0$
−10
−5
0
5
10
x
−4
−2
0
2
4
y

d)

$$\boxed{f(x,y)=\ln\left(x+y^2\right)}$$

$$\frac{\partial f}{\partial x} =$$

d)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\frac{\partial f}{\partial x} = \frac{1}{x + y^2}$$

$$\boxed{(\ln x)' = \frac{1}{x}}$$

d)

$$f(x,y) = \ln\left(x + y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2} \cdot \left(x + y^2\right)'_x$$

$$(\ln x)' = \frac{1}{x}$$

d)

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2} \cdot \left(x+y^2\right)'_x = \frac{1}{x+y^2} \cdot$$

$$\boxed{f(x,y) = \ln\left(x+y^2\right)}$$

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$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2} \cdot \left(x+y^2\right)'_x = \frac{1}{x+y^2} \cdot 1$$

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$$\boxed{\left(x^n\right)' = nx^{n-1}}$$

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$$\frac{\partial f}{\partial y} =$$

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$$\frac{\partial^4 f}{\partial x^3 \partial y} \rightarrow f_{xxxy}$$

$$f(x, y) = \ln\left(x + y^2\right)$$

d)

$$\frac{\partial f}{\partial x} = \frac{1}{x + y^2} \cdot \left(x + y^2\right)'_x = \frac{1}{x + y^2} \cdot 1 = \frac{1}{x + y^2}$$

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$$\frac{\partial^4 f}{\partial x^3 \partial y} \to f_{xxxy}$$

e)

$$\frac{\partial^2 f}{\partial x^2} =$$

d)

$$f(x,y) = \ln\left(x+y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2} \cdot \left(x+y^2\right)'_x = \frac{1}{x+y^2} \cdot 1 = \frac{1}{x+y^2}$$

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$$(\ln x)' = \frac{1}{x}$$

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e)

$$\frac{\partial^4 f}{\partial x^3 \partial y} \rightarrow f_{xxxy}$$

$$\frac{\partial^2 f}{\partial x^2} = f_{xx}$$

d)

$$f(x,y) = \ln\left(x + y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x + y^2} \cdot \left(x + y^2\right)'_x = \frac{1}{x + y^2} \cdot 1 = \frac{1}{x + y^2}$$

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e)

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x$$

d)

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e)

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x+y^2\right)^{-2}$$

d)

$$f(x,y) = \ln\left(x+y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x = \frac{1}{x+y^2}\cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

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$$\frac{\partial^4 f}{\partial x^3 \partial y} \rightarrow f_{xxxy}$$

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x+y^2\right)^{-2} \cdot \overset{=1}{\boxed{\left(x+y^2\right)'_x}} = -\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3}$$

d)

$$\boxed{f(x,y) = \ln\left(x + y^2\right)}$$

$$\frac{\partial f}{\partial x} = \frac{1}{x + y^2} \cdot \left(x + y^2\right)'_x = \frac{1}{x + y^2} \cdot 1 = \frac{1}{x + y^2} = \left(x + y^2\right)^{-1}$$

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e)

$$\boxed{\frac{\partial^4 f}{\partial x^3 \partial y} \to f_{xxxy}}$$

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x + y^2\right)^{-2} \cdot \overset{= 1}{\boxed{\left(x + y^2\right)'_x}} = -\left(x + y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x + y^2\right)^{-3} \cdot \left(x + y^2\right)'_x$$

d)

$$\boxed{f(x,y) = \ln\left(x+y^2\right)}$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2} \cdot \left(x+y^2\right)'_x = \frac{1}{x+y^2} \cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

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$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3} \cdot \overset{=1}{\boxed{\left(x+y^2\right)'_x}}$$

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$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = 2\left(x+y^2\right)^{-3}$$

d)

$$f(x,y) = \ln\left(x + y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2} \cdot \left(x+y^2\right)'_x = \frac{1}{x+y^2} \cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

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$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x+y^2\right)^{-2} \cdot \overset{=1}{\boxed{\left(x+y^2\right)'_x}} = -\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3} \cdot \overset{=1}{\boxed{\left(x+y^2\right)'_x}} = 2\left(x+y^2\right)^{-3}$$

$$\frac{\partial^4 f}{\partial x^3 \partial y} =$$

d)

$$\boxed{f(x,y) = \ln\left(x+y^2\right)}$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x = \frac{1}{x+y^2}\cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

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$$\boxed{\frac{\partial^4 f}{\partial x^3 \partial y} \to f_{xxxy}}$$

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x+y^2\right)^{-2}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = -\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = 2\left(x+y^2\right)^{-3}$$

$$\frac{\partial^4 f}{\partial x^3 \partial y} = f_{xxxy}$$

d)

$$\boxed{f(x,y) = \ln\left(x+y^2\right)}$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x = \frac{1}{x+y^2}\cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

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e)

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$$\frac{\partial^4 f}{\partial x^3 \partial y} = f_{xxxy} = (f_{xxx})_y$$

d)

$$f(x,y)=\ln\left(x+y^2\right)$$

$$\frac{\partial f}{\partial x}=\frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x=\frac{1}{x+y^2}\cdot 1=\frac{1}{x+y^2}=\left(x+y^2\right)^{-1}$$

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$$(\ln x)'=\frac{1}{x}$$

$$\left(x^n\right)'=nx^{n-1}$$

e)

$$\frac{\partial^4 f}{\partial x^3\partial y}\ \rightarrow\ f_{xxxy}$$

$$\frac{\partial^2 f}{\partial x^2}=f_{xx}=\left(f_x\right)_x=-\left(x+y^2\right)^{-2}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}}=-\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3}=f_{xxx}=\left(f_{xx}\right)_x=-(-2)\left(x+y^2\right)^{-3}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}}=2\left(x+y^2\right)^{-3}$$

$$\frac{\partial^4 f}{\partial x^3\partial y}=f_{xxxy}=\left(f_{xxx}\right)_y=-6\left(x+y^2\right)^{-4}$$

d)

$$\boxed{f(x,y)=\ln\left(x+y^2\right)}$$

$$\frac{\partial f}{\partial x}=\frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x=\frac{1}{x+y^2}\cdot 1=\frac{1}{x+y^2}=\left(x+y^2\right)^{-1}$$

$$\frac{\partial f}{\partial y}=\frac{1}{x+y^2}\cdot\left(x+y^2\right)'_y=\frac{1}{x+y^2}\cdot 2y=\frac{2y}{x+y^2}$$

$$\boxed{(\ln x)'=\frac{1}{x}}$$

$$\boxed{\left(x^n\right)'=nx^{n-1}}$$

e)

$$\boxed{\frac{\partial^4 f}{\partial x^3\partial y}\ \rightarrow\ f_{xxxy}}$$

$$\frac{\partial^2 f}{\partial x^2}=f_{xx}=(f_x)_x=-\left(x+y^2\right)^{-2}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}}=-\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3}=f_{xxx}=(f_{xx})_x=-(-2)\left(x+y^2\right)^{-3}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}}=2\left(x+y^2\right)^{-3}$$

$$\frac{\partial^4 f}{\partial x^3\partial y}=f_{xxxy}=(f_{xxx})_y=-6\left(x+y^2\right)^{-4}\cdot\left(x+y^2\right)'_y$$

d)

$$f(x,y) = \ln\left(x+y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x = \frac{1}{x+y^2}\cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

$$\frac{\partial f}{\partial y} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_y = \frac{1}{x+y^2}\cdot 2y = \frac{2y}{x+y^2}$$

$$(\ln x)' = \frac{1}{x}$$

$$(x^n)' = nx^{n-1}$$

e)

$$\frac{\partial^4 f}{\partial x^3 \partial y} \rightarrow f_{xxxy}$$

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x+y^2\right)^{-2}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = -\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = 2\left(x+y^2\right)^{-3}$$

$$\frac{\partial^4 f}{\partial x^3 \partial y} = f_{xxxy} = (f_{xxx})_y = -6\left(x+y^2\right)^{-4}\cdot\underset{=2y}{\boxed{\left(x+y^2\right)'_y}}$$

d)

$$f(x,y) = \ln\left(x+y^2\right)$$

$$\frac{\partial f}{\partial x} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_x = \frac{1}{x+y^2}\cdot 1 = \frac{1}{x+y^2} = \left(x+y^2\right)^{-1}$$

$$\frac{\partial f}{\partial y} = \frac{1}{x+y^2}\cdot\left(x+y^2\right)'_y = \frac{1}{x+y^2}\cdot 2y = \frac{2y}{x+y^2}$$

$$(\ln x)' = \frac{1}{x}$$

$$\left(x^n\right)' = nx^{n-1}$$

e)

$$\frac{\partial^4 f}{\partial x^3 \partial y} \to f_{xxxy}$$

$$\frac{\partial^2 f}{\partial x^2} = f_{xx} = (f_x)_x = -\left(x+y^2\right)^{-2}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = -\left(x+y^2\right)^{-2}$$

$$\frac{\partial^3 f}{\partial x^3} = f_{xxx} = (f_{xx})_x = -(-2)\left(x+y^2\right)^{-3}\cdot\overset{=1}{\boxed{\left(x+y^2\right)'_x}} = 2\left(x+y^2\right)^{-3}$$

$$\frac{\partial^4 f}{\partial x^3 \partial y} = f_{xxxy} = (f_{xxx})_y = -6\left(x+y^2\right)^{-4}\cdot\underset{=2y}{\boxed{\left(x+y^2\right)'_y}} = \frac{-12y}{\left(x+y^2\right)^4}$$

drugi zadatak

Zadatak 2

Zadana je ploha $z = x^3 + y^3$.

a) *Odredite na zadanoj plohi sve točke kojima je* x*-koordinata jednaka* 1 *i u kojima su tangencijalne ravnine plohe okomite na ravninu* $x + y + 51z = 0$.

b) *U svim tako pronađenim točkama napišite jednadžbe tangencijalnih ravnina i jednadžbe normala zadane plohe.*

Rješenje

a) $z = x^3 + y^3$

Rješenje

a) $z = x^3 + y^3$

$$\Sigma \ldots \; x + y + 51z = 0$$

Rješenje

a) $z = x^3 + y^3$

$$\underline{\quad \Sigma \ldots\ x + y + 51z = 0 \quad}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \vec{n}_t \cdot \vec{n}_\Sigma = 0$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots \; x + y + 51z = 0}{\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \ \Leftrightarrow\ \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = ($$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \big(3x^2,$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots\ x + y + 51z = 0}{\Pi_t \perp \Sigma \ \Leftrightarrow\ \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \big(3x^2, 3y^2,$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots\ x + y + 51z = 0}{\Pi_t \perp \Sigma \ \Leftrightarrow\ \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots \; x + y + 51z = 0}{\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2,\ 3y^2,\ -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2,\ 3y^2,\ -1\right) \cdot (1, 1, 51) = 0$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x},\ \frac{\partial z}{\partial y},\ -1\right)$$

$$\vec{n}_t = \left(3x^2,\ 3y^2,\ -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2,\ 3y^2,\ -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \, \frac{\partial z}{\partial y}, \, -1 \right)$$

$$\vec{n}_t = \left(3x^2, \, 3y^2, \, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, \, 3y^2, \, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \, \frac{\partial z}{\partial y}, \, -1 \right)$$

$$\vec{n}_t = \left(3x^2, \, 3y^2, \, -1 \right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, \, 3y^2, \, -1 \right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

Rješenje

a) $z = x^3 + y^3, \qquad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = \left(3x^2,\, 3y^2,\, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2,\, 3y^2,\, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$\boxed{x = 1}$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \; \frac{\partial z}{\partial y}, \; -1 \right)$$

$$\vec{n}_t = \left(3x^2, \; 3y^2, \; -1 \right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, \; 3y^2, \; -1 \right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \qquad 3y^2 = 48$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots \; x + y + 51z = 0}{\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = \left(3x^2,\, 3y^2,\, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2,\, 3y^2,\, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 =$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots x + y + 51z = 0}{\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\underline{\Sigma \ldots \; x + y + 51z = 0}$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 =$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$T_1(1, 4, 65)$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x},\ \frac{\partial z}{\partial y},\ -1\right)$$

$$\vec{n}_t = \left(3x^2,\ 3y^2,\ -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2,\ 3y^2,\ -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$\boxed{x = 1}$

$$3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad T_2(1, -4, -63)$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{T_1(1, 4, 65)} \qquad \boxed{T_2(1, -4, -63)}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\; \Leftrightarrow \;\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = \left(3x^2, \, 3y^2, \, -1 \right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, \, 3y^2, \, -1 \right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$\boxed{x = 1}$

$$3y^2 = 48 \rightsquigarrow y^2 = 16$$

b)

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\frac{\Sigma \ldots\ x + y + 51z = 0}{}$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

$$\vec{n}_t = \left(3x^2, 3y^2, -1\right)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1}$$

$$3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

b) $T_1(1, 4, 65)$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = \left(3x^2, \, 3y^2, \, -1 \right)$$

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$$\left(3x^2, \, 3y^2, \, -1 \right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

b) $T_1(1, 4, 65) \qquad \vec{n}_{t_1} = (3, 48, -1)$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1\right)$$

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$$\left(3x^2, 3y^2, -1\right) \cdot (1, 1, 51) = 0$$

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$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

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$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

b) $T_1(1, 4, 65) \qquad \vec{n}_{t_1} = (3, 48, -1)$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \iff \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

$$\vec{n}_t = (3x^2, \, 3y^2, \, -1)$$

$$\vec{n}_\Sigma = (1, 1, 51)$$

$$(3x^2, \, 3y^2, \, -1) \cdot (1, 1, 51) = 0$$

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$$\boxed{x = 1} \qquad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (3, 48, -1)$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

Rješenje

a) $z = x^3 + y^3, \qquad T(1, y, z)$

$$\Sigma \ldots\; x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \;\Leftrightarrow\; \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x},\, \frac{\partial z}{\partial y},\, -1\right)$$

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$$\left(3x^2,\, 3y^2,\, -1\right) \cdot (1, 1, 51) = 0$$

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$$\boxed{x = 1} \qquad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{T_1(1, 4, 65)} \qquad \boxed{T_2(1, -4, -63)}$$

b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots \; x + y + 51z = 0$$

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$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

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$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

$$3(x - 1) + 48(y - 4) - 1 \cdot (z - 65) = 0$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

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$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

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b) $\overset{x_0}{} \ \overset{y_0}{} \ \overset{z_0}{}$

$$T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

$$3(x - 1) + 48(y - 4) - 1 \cdot (z - 65) = 0$$

$$\Pi_1 \ldots\ 3x + 48y - z - 130 = 0$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{T_1(1, 4, 65)} \qquad \boxed{T_2(1, -4, -63)}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$$\Sigma \ldots\ x + y + 51z = 0$$

$$\Pi_t \perp \Sigma \quad \Leftrightarrow \quad \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

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$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

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$$n_1 \ldots\ \underline{\qquad\quad} = \underline{\qquad\quad} = \underline{\qquad\quad}$$

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Rješenje

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$\boxed{x = 1}$ $\quad 3y^2 = 48 \rightsquigarrow y^2 = 16$

b) $\overset{x_0\;y_0\;z_0}{T_1(1, 4, 65)} \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

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$$n_1 \ldots \; \frac{\qquad}{3} = \frac{\qquad}{48} = \frac{\qquad}{-1}$$

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Rješenje

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b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

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$$\Pi_1 \ldots \; 3x + 48y - z - 130 = 0$$

$$n_1 \ldots \; \frac{x-1}{3} = \frac{}{48} = \frac{}{-1}$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{T_1(1, 4, 65)} \qquad \boxed{T_2(1, -4, -63)}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

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$$n_1 \ldots\ \frac{x-1}{3} = \frac{y-4}{48} = \frac{\qquad}{-1}$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

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Rješenje

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$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

b) $\overset{x_0\;y_0\;z_0}{T_1(1, 4, 65)} \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

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$$\boxed{T_1(1, 4, 65)} \qquad \boxed{T_2(1, -4, -63)}$$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

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$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

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$$\boxed{\begin{array}{c} \Pi_1 \ldots \; 3x + 48y - z - 130 = 0 \\ n_1 \ldots \; \dfrac{x-1}{3} = \dfrac{y-4}{48} = \dfrac{z-65}{-1} \end{array}}$$

Rješenje

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$T_2(1, -4, -63)$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

Rješenje

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$\boxed{x = 1}$ $\quad 3y^2 = 48 \rightsquigarrow y^2 = 16$

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$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

$$3(x - 1) + 48(y - 4) - 1 \cdot (z - 65) = 0$$

$$\boxed{\begin{array}{c} \Pi_1 \ldots \; 3x + 48y - z - 130 = 0 \\ n_1 \ldots \; \frac{x-1}{3} = \frac{y-4}{48} = \frac{z-65}{-1} \end{array}}$$

$$T_2(1, -4, -63) \qquad \vec{n}_{t_2} = (3, 48, -1)$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

$$\boxed{T_1(1, 4, 65)} \qquad \boxed{T_2(1, -4, -63)}$$

Rješenje

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$T_2(\overset{x_0}{1}, \overset{y_0}{-4}, \overset{z_0}{-63}) \qquad \vec{n}_{t_2} = (3, 48, -1)$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

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Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

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$$\boxed{\boxed{T_1(1, 4, 65)}} \qquad \boxed{\boxed{T_2(1, -4, -63)}}$$

b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$A(x - x_0) + B(y - y_0) + C(z - z_0) = 0$$

$$3(x - 1) + 48(y - 4) - 1 \cdot (z - 65) = 0$$

$$\boxed{\begin{array}{c} \Pi_1 \ldots\ 3x + 48y - z - 130 = 0 \\ n_1 \ldots\ \frac{x-1}{3} = \frac{y-4}{48} = \frac{z-65}{-1} \end{array}}$$

$T_2(\overset{x_0}{1}, \overset{y_0}{-4}, \overset{z_0}{-63}) \qquad \vec{n}_{t_2} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

Rješenje

a) $z = x^3 + y^3, \quad T(1, y, z)$

$\Sigma \ldots \; x + y + 51z = 0$

$$\Pi_t \perp \Sigma \quad \Leftrightarrow \quad \boxed{\vec{n}_t \cdot \vec{n}_\Sigma = 0}$$

$$\vec{n}_t = \left(\frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, -1 \right)$$

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$$\vec{n}_\Sigma = (1, 1, 51)$$

$$\left(3x^2, \, 3y^2, \, -1 \right) \cdot (1, 1, 51) = 0$$

$$3x^2 + 3y^2 - 51 = 0$$

$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

b) $T_1(\overset{x_0}{1}, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

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$$3(x - 1) + 48(y + 4) - 1 \cdot (z + 63) = 0$$

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Rješenje

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$T_2(\overset{x_0}{1}, \overset{y_0}{-4}, \overset{z_0}{-63}) \qquad \vec{n}_{t_2} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

$$3(x - 1) + 48(y + 4) - 1 \cdot (z + 63) = 0$$

$$\Pi_2 \ldots \; 3x + 48y - z + 126 = 0$$

$$y_1 = 4, \quad y_2 = -4, \quad z_1 = 1^3 + 4^3 = 65, \quad z_2 = 1^3 + (-4)^3 = -63$$

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Rješenje

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$$\boxed{x = 1} \quad 3y^2 = 48 \rightsquigarrow y^2 = 16$$

b) $\overset{x_0}{T_1}(1, \overset{y_0}{4}, \overset{z_0}{65}) \qquad \vec{n}_{t_1} = (\overset{A}{3}, \overset{B}{48}, \overset{C}{-1})$

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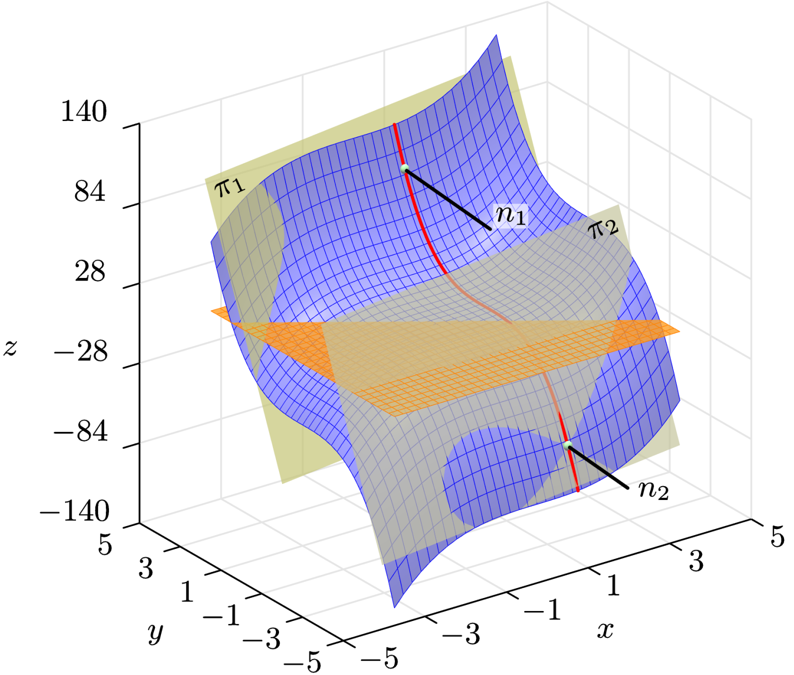
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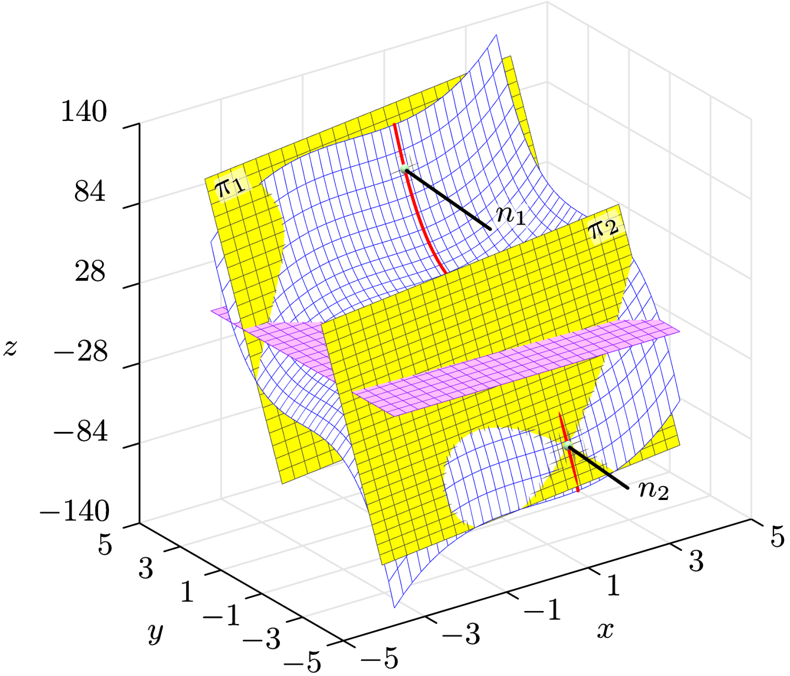
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treći zadatak

Zadatak 3

Zadana je ploha $x^2z + y^2z = 9$ *i pravac*

$$p \ldots \ \frac{x-1}{1} = \frac{y+2}{1} = \frac{z+1}{1}.$$

Odredite jednadžbe tangencijalnih ravnina i normala na zadanu plohu u točkama u kojima zadani pravac siječe tu plohu.

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}$$

$$x^2z+y^2z=9$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\left\{ \begin{array}{l} \\ \\ \\ \end{array} \right.$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ \\ \\ \end{cases}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ \end{cases}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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Rješenje

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$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

$$(t+1)^2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

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Rješenje

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$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

Rješenje

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$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\Big(\qquad\qquad\qquad\qquad \Big)$$

Rješenje

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$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big((t+1)^2 \qquad\qquad\qquad \big)$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1} = \frac{y+2}{1} = \frac{z+1}{1} = t$$

$$x^2z + y^2z = 9$$

$$(t+1)^2(t-1) + (t-2)^2(t-1) = 9$$

$$(t-1)\big((t+1)^2 + \qquad\qquad \big)$$

$$\begin{cases} x = t+1 \\ y = t-2 \\ z = t-1 \end{cases}$$

Rješenje

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$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

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$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big($$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9 \leftarrow \begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1\end{cases}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\bigl((t+1)^2+(t-2)^2\bigr)=9$$

$$(t-1)\bigl(t^2+2t+1+t^2-4t$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

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$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

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Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big($$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x = t+1 \\ y = t-2 \\ z = t-1 \end{cases}$$

$$x^2z + y^2z = 9$$

$$(t+1)^2(t-1) + (t-2)^2(t-1) = 9$$

$$(t-1)\big((t+1)^2 + (t-2)^2\big) = 9$$

$$(t-1)\big(t^2 + 2t + 1 + t^2 - 4t + 4\big) = 9$$

$$(t-1)\big(2t^2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

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$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x = t+1 \\ y = t-2 \\ z = t-1 \end{cases}$$

$$x^2z + y^2z = 9$$

$$(t+1)^2(t-1) + (t-2)^2(t-1) = 9$$

$$(t-1)\big((t+1)^2 + (t-2)^2\big) = 9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big) = 9$$

$$(t-1)\big(2t^2-2t+5\big)$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

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$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1} = \frac{y+2}{1} = \frac{z+1}{1} = t$$

$$x^2z + y^2z = 9$$

$$\begin{cases} x = t+1 \\ y = t-2 \\ z = t-1 \end{cases}$$

$$(t+1)^2(t-1) + (t-2)^2(t-1) = 9$$

$$(t-1)\big((t+1)^2 + (t-2)^2\big) = 9$$

$$(t-1)\big(t^2 + 2t + 1 + t^2 - 4t + 4\big) = 9$$

$$(t-1)\big(2t^2 - 2t + 5\big) = 9$$

$$2t^3 - 2t^2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9 \leftarrow \begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

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$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

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$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9 \leftarrow \begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

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$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1\end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

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$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

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$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

Rješenje

presjek pravca i plohe

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$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

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$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

$$\begin{array}{c|c|c|c|c} & 2 & & & \\ \hline & & & & \end{array}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4		

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

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$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9 \leftarrow \begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

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$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2				

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2			

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x = t+1 \\ y = t-2 \\ z = t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

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$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4	7	-14
2	2	0		

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4	7	-14
2	2	0	7	

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9 \leftarrow$$

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$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4	7	-14
2	2	0	7	0

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1} = \frac{y+2}{1} = \frac{z+1}{1} = t$$

$$x^2z + y^2z = 9$$

$$\begin{cases} x = t+1 \\ y = t-2 \\ z = t-1 \end{cases}$$

$$(t+1)^2(t-1) + (t-2)^2(t-1) = 9$$

$$(t-1)\big((t+1)^2 + (t-2)^2\big) = 9$$

$$(t-1)\big(t^2 + 2t + 1 + t^2 - 4t + 4\big) = 9$$

$$(t-1)\big(2t^2 - 2t + 5\big) = 9$$

$$2t^3 - 2t^2 + 5t - 2t^2 + 2t - 5 - 9 = 0$$

$$2t^3 - 4t^2 + 7t - 14 = 0$$

$$(t-2)$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2	0	7	0

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

$$\begin{array}{c|c|c|c|c} & 2 & -4 & 7 & -14 \\ \hline 2 & 2 & 0 & 7 & 0 \end{array}$$

$$(t-2)\big(2t^2+0\cdot t+7\big)$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

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$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4	7	-14
2	2	0	7	0

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

$$\begin{array}{c|c|c|c|c} & 2 & -4 & 7 & -14 \\ \hline 2 & 2 & 0 & 7 & 0 \end{array}$$

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

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$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2	0	7	0

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$t=2$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

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$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2	0	7	0

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$\boxed{t=2}$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

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$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2	0	7	0

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$\boxed{t=2} \qquad 2t^2+7=0$$

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

$$(t-1)\big(2t^2-2t+5\big)=9$$

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$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4	7	-14
2	2	0	7	0

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$\boxed{t=2}$$

$$2t^2+7=0$$

nema realnih rješenja

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$x^2z+y^2z=9$$

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$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	-4	7	-14
2	2	0	7	0

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$\boxed{t=2}$$

$$2t^2+7=0$$

nema realnih rješenja

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

$$(t-1)\big(t^2+2t+1+t^2-4t+4\big)=9$$

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$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

$$2t^3-4t^2+7t-14=0$$

$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2	0	7	0

$$\begin{cases} x=t+1\\ y=t-2\\ z=t-1\end{cases}$$

$$S(3,0,1)$$

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$\boxed{t=2}$$

$$2t^2+7=0$$

nema realnih rješenja

Rješenje

presjek pravca i plohe

$$\frac{x-1}{1}=\frac{y+2}{1}=\frac{z+1}{1}=t$$

$$x^2z+y^2z=9$$

$$(t+1)^2(t-1)+(t-2)^2(t-1)=9$$

$$(t-1)\big((t+1)^2+(t-2)^2\big)=9$$

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$$2t^3-2t^2+5t-2t^2+2t-5-9=0$$

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$$1,\ -1,\ 2,\ -2,\ 7,\ -7,\ 14,\ -14$$

	2	−4	7	−14
2	2	0	7	0

$$\begin{cases} x=t+1 \\ y=t-2 \\ z=t-1 \end{cases}$$

$$\boxed{S(3,0,1)}$$

$$(t-2)\big(2t^2+0\cdot t+7\big)=0$$

$$(t-2)\big(2t^2+7\big)=0$$

$$\boxed{t=2}$$

$$2t^2+7=0$$

nema realnih rješenja

$$x^2 z + y^2 z = 9$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(3, 0, 1)$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$x^2 z + y^2 z = 9$$

$$x^2 z + y^2 z - 9 = 0$$

$$F(x, y, z) = x^2 z + y^2 z - 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$\overset{x_0}{S(3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x =$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$\overset{x_0\ y_0\ z_0}{S(3, 0, 1)}$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$\overset{x_0}{S(3},\overset{y_0}{0},\overset{z_0}{1)}$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y =$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y = 2yz$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\overset{\color{blue}{x_0\ y_0\ z_0}}{S(3, 0, 1)}$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z =$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x,y,z) = x^2z + y^2z - 9$$

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$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z)$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \big($$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$\overset{x_0}{S(3,}\overset{y_0}{0,}\overset{z_0}{1)}$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \big(2xz,$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$\overset{x_0\ y_0\ z_0}{S(3, 0, 1)}$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \big(2xz,\ 2yz,$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

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$$\overset{x_0}{S(3},\overset{y_0}{0},\overset{z_0}{1)}$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \left(2xz,\ 2yz,\ x^2 + y^2\right)$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \left(2xz,\ 2yz,\ x^2 + y^2\right)$$

$$\vec{n}_t = ($$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\overset{x_0}{S(3},\overset{y_0}{0},\overset{z_0}{1)}$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \left(2xz,\ 2yz,\ x^2 + y^2\right)$$

$$\vec{n}_t = (6,$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$\overset{x_0}{S(3,}\overset{y_0}{0,}\overset{z_0}{1)}$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \left(2xz,\ 2yz,\ x^2 + y^2\right)$$

$$\vec{n}_t = (6, 0,$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \left(2xz,\ 2yz,\ x^2 + y^2\right)$$

$$\vec{n}_t = (6, 0, 9)$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

$$\vec{n}_t = (F_x, F_y, F_z), \quad \vec{n}_t = \left(2xz,\ 2yz,\ x^2 + y^2\right)$$

$$\vec{n}_t = (6, 0, 9) = 3 \cdot (2, 0, 3)$$

$$x^2z + y^2z = 9$$

$$x^2z + y^2z - 9 = 0$$

$$F(x, y, z) = x^2z + y^2z - 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

$$F_x = 2xz, \quad F_y = 2yz, \quad F_z = x^2 + y^2$$

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$$S(\overset{x_0}{3}, \overset{y_0}{0}, \overset{z_0}{1})$$

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$$\vec{n}_t = (6, 0, 9) = 3 \cdot (\overset{A}{2}, \overset{B}{0}, \overset{C}{3})$$

$$2 \cdot (x - 3) + 0 \cdot (y - 0) + 3 \cdot (z - 1) = 0$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

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$$\Pi_t \ldots\ 2x + 3z - 9 = 0$$

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$$\boxed{\Pi_t \ldots 2x + 3z - 9 = 0}$$

$$n \ldots \underline{\hspace{2cm}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

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$$2\cdot(x-3)+0\cdot(y-0)+3\cdot(z-1)=0$$

$$\boxed{\Pi_t \ldots\ 2x+3z-9=0}$$

$$n \ldots\ \frac{\qquad}{2}=\frac{\qquad}{0}=\frac{\qquad}{3}$$

$$x^2z + y^2z = 9$$

$$\boxed{A(x - x_0) + B(y - y_0) + C(z - z_0) = 0}$$

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$$2 \cdot (x - 3) + 0 \cdot (y - 0) + 3 \cdot (z - 1) = 0$$

$$\boxed{\Pi_t \ldots\ 2x + 3z - 9 = 0}$$

$$n \ldots\ \frac{x - 3}{2} = \frac{\qquad}{0} = \frac{\qquad}{3}$$

$$\boxed{A(x-x_0)+B(y-y_0)+C(z-z_0)=0}$$

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$$\boxed{\Pi_t\ldots\ 2x+3z-9=0}$$

$$n\ldots\ \frac{x-3}{2}=\frac{y}{0}=\frac{\quad}{3}$$

$$x^2z + y^2z = 9$$

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$$n \ldots\ \frac{x - 3}{2} = \frac{y}{0} = \frac{z - 1}{3}$$

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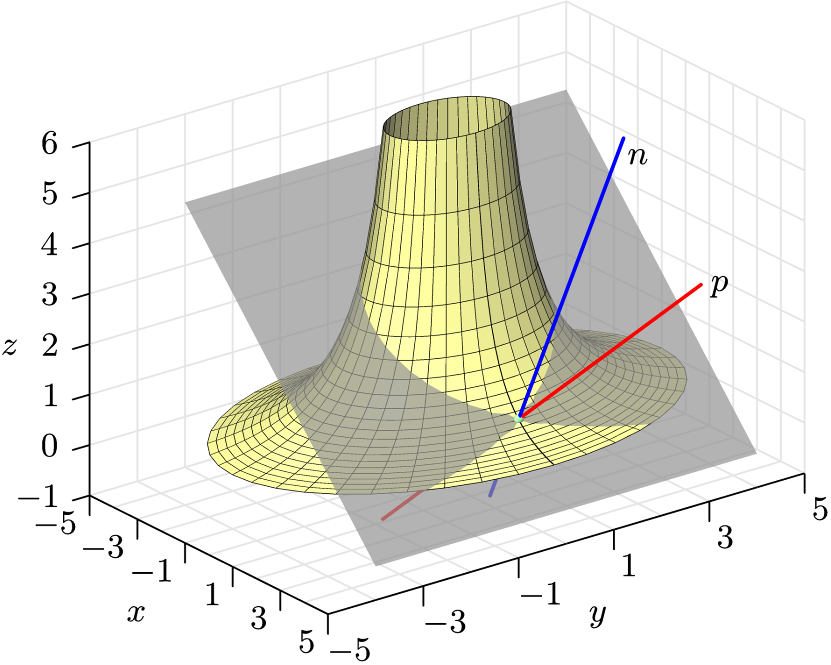
$$\boxed{\Pi_t\ldots\ 2x+3z-9=0}$$

$$\boxed{n\ldots\ \frac{x-3}{2}=\frac{y}{0}=\frac{z-1}{3}}$$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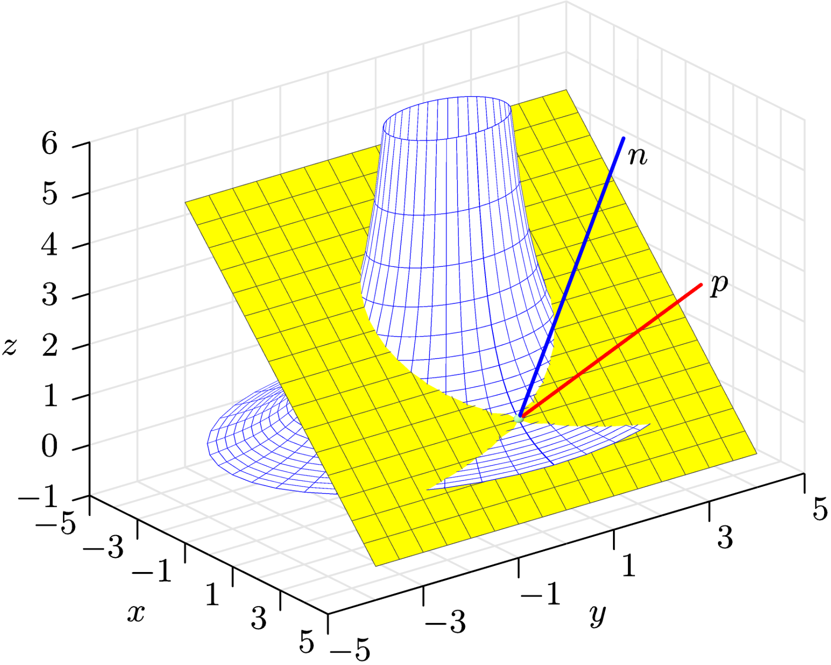
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Napomena

$$z = f(x, y)$$

Napomena

$$z = f(x, y) \;\leftsquigarrow\; \boxed{\text{eksplicitni oblik jednadžbe plohe}}$$

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$$z = f(x, y)$$

eksplicitni oblik jednadžbe plohe

$$f(x, y) - z = 0$$

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$$z = f(x, y) \leftsquigarrow \boxed{\text{eksplicitni oblik jednadžbe plohe}}$$

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$$F(x, y, z) = f(x, y) - z$$

$$F_x =$$

Napomena

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$$F(x, y, z) = f(x, y) - z$$

$$F_x = f_x$$

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$$F(x, y, z) = f(x, y) - z$$

$$F_x = f_x, \quad F_y =$$

Napomena

$$z = f(x, y) \leftsquigarrow \boxed{\text{eksplicitni oblik jednadžbe plohe}}$$

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$$F(x,y,z) = f(x,y) - z$$

$$F_x = f_x, \quad F_y = f_y, \quad F_z =$$

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$$z = f(x,y) \quad \leftsquigarrow \text{ eksplicitni oblik jednadžbe plohe}$$

$$f(x,y) - z = 0 \quad \leftsquigarrow \text{ implicitni oblik jednadžbe plohe}$$

$$F(x,y,z) = f(x,y) - z$$

$$F_x = f_x, \quad F_y = f_y, \quad F_z = -1$$

Napomena

$$z = f(x, y) \leftsquigarrow \boxed{\text{eksplicitni oblik jednadžbe plohe}}$$

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$$F(x, y, z) = f(x, y) - z$$

$$F_x = f_x, \quad F_y = f_y, \quad F_z = -1$$

$$\vec{n}_t = \left(f_x, f_y, -1\right)$$

Napomena

$$z = f(x, y) \quad \leftsquigarrow \quad \boxed{\text{eksplicitni oblik jednadžbe plohe}}$$

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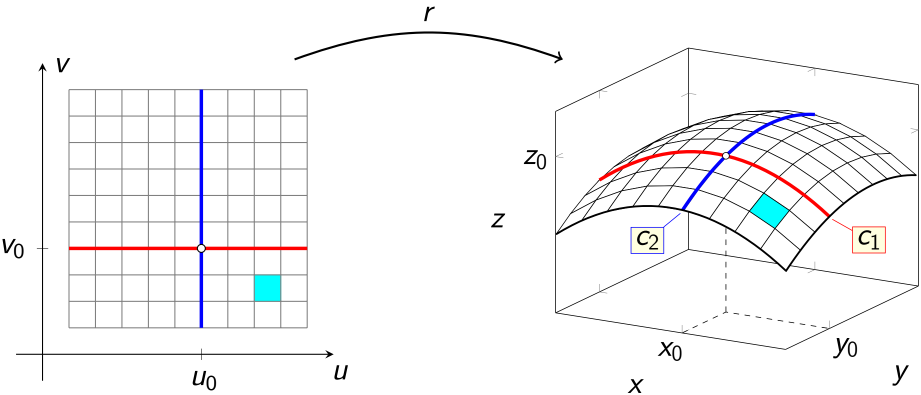
$$F(x, y, z) = f(x, y) - z$$

$$F_x = f_x, \quad F_y = f_y, \quad F_z = -1$$

$$\vec{n}_t = \left(f_x, f_y, -1\right) \quad \leftsquigarrow \quad \boxed{\text{vektor normale tangencijalne ravnine}}$$

četvrti zadatak

Parametrizacija plohe



$$r(u,v) = \big(x(u,v),\ y(u,v),\ z(u,v)\big) \qquad r(u_0,v_0) = (x_0, y_0, z_0)$$

$c_1(u) = r(u, v_0)$ ← parametarska *u*-crta

$c_2(v) = r(u_0, v)$ ← parametarska *v*-crta

Zadatak 4

Zadana je ploha

$$r(u,v) = \big(\sin u,\, \sin v,\, \sin(u+v)\big)$$

i točka A na toj plohi s parametrima $u = \frac{\pi}{3}$, $v = \frac{\pi}{6}$.

a) *Odredite Kartezijeve koordinate točke A.*

b) *Odredite dva vektora koji razapinju tangencijalnu ravninu zadane plohe u točki A.*

c) *Nađite jednadžbu tangencijalne ravnine plohe u točki A.*

Rješenje $A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u,v) = \big(\sin u,\, \sin v,\, \sin(u+v)\big)}$$

a)

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3}, \ v = \frac{\pi}{6}$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin (u + v)\big)}$$

a)

$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) =$

Rješenje $A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin(u + v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) =$$

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u,v) = \big(\sin u, \sin v, \sin{(u+v)}\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \Big(\sin \frac{\pi}{3},$$

Rješenje

$$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$$

$$\boxed{r(u,v) = \big(\sin u,\, \sin v,\, \sin(u+v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3},\, \sin\frac{\pi}{6},\right.$$

Rješenje

$$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin(u + v)\big)}$$

a)

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Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin(u + v)\big)}$$

a)

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$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) =$$

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$\boxed{r(u, v) = \big(\sin u,\, \sin v,\, \sin(u+v)\big)}$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3},\ \sin\frac{\pi}{6},\ \sin\left(\frac{\pi}{3} + \frac{\pi}{6}\right)\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\sin\frac{\pi}{3},\ \sin\frac{\pi}{6},\right.$$

Rješenje

$$A \rightsquigarrow u = \frac{\pi}{3}, \;\; v = \frac{\pi}{6}$$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin(u + v)\big)}$$

a)

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Rješenje

a) $A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin(u + v)\big)}$$

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3}, \sin\frac{\pi}{6}, \sin\left(\frac{\pi}{3} + \frac{\pi}{6}\right)\right)$$

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Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u,v) = \big(\sin u,\, \sin v,\, \sin(u+v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3},\, \sin\frac{\pi}{6},\, \sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\sin\frac{\pi}{3},\, \sin\frac{\pi}{6},\, \sin\frac{\pi}{2}\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\frac{\sqrt{3}}{2},\right.$$

Rješenje

$$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$$

$$\boxed{r(u, v) = \big(\sin u,\ \sin v,\ \sin\,(u + v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3},\ \sin\frac{\pi}{6},\ \sin\left(\frac{\pi}{3} + \frac{\pi}{6}\right)\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\sin\frac{\pi}{3},\ \sin\frac{\pi}{6},\ \sin\frac{\pi}{2}\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\frac{\sqrt{3}}{2},\ \frac{1}{2},\right.$$

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u, v) = \big(\sin u, \sin v, \sin(u+v)\big)}$$

a)

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$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\sin\frac{\pi}{3}, \sin\frac{\pi}{6}, \sin\frac{\pi}{2}\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}, 1\right)$$

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u,v) = \big(\sin u,\, \sin v,\, \sin\,(u+v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3},\, \sin\frac{\pi}{6},\, \sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\sin\frac{\pi}{3},\, \sin\frac{\pi}{6},\, \sin\frac{\pi}{2}\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\frac{\sqrt{3}}{2},\, \frac{1}{2},\, 1\right)$$

$$A\left(\frac{\sqrt{3}}{2},\, \frac{1}{2},\, 1\right)$$

Rješenje

$$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$$

$$\boxed{r(u, v) = \left(\sin u, \sin v, \sin\left(u + v\right)\right)}$$

a)

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$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}, 1\right)$$

$$A\left(\frac{\sqrt{3}}{2}, \frac{1}{2}, 1\right)$$

b)

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u,v) = \big(\sin u, \sin v, \sin(u+v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3}, \sin\frac{\pi}{6}, \sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\sin\frac{\pi}{3}, \sin\frac{\pi}{6}, \sin\frac{\pi}{2}\right)$$

$$r\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}, 1\right)$$

$$A\left(\frac{\sqrt{3}}{2}, \frac{1}{2}, 1\right)$$

b)

$r_u =$

Rješenje

$A \rightsquigarrow u = \frac{\pi}{3},\ v = \frac{\pi}{6}$

$$\boxed{r(u,v) = \big(\sin u,\, \sin v,\, \sin(u+v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\sin\frac{\pi}{3},\, \sin\frac{\pi}{6},\, \sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right)$$

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b)

$$r_u = \big(\cos u,\ 0,\ \cos(u+v)\big)$$

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$$A\left(\frac{\sqrt{3}}{2}, \, \frac{1}{2}, \, 1\right)$$

b)

$$r_u = \big(\cos u, \, 0, \, \cos(u+v)\big)$$

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$$r_u = \big(\cos u,\ 0,\ \cos(u+v)\big)$$

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b)

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$$r_v = \left(0, \, \cos v, \, \cos(u+v)\right)$$

$$r_u\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(\frac{1}{2}, \, 0, \, 0\right)$$

$$r_v\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(0, \, \frac{\sqrt{3}}{2}, \, 0\right)$$

c)

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c)

$$r_u\left(\frac{\pi}{3}, \frac{\pi}{6}\right) \times r_v\left(\frac{\pi}{3}, \frac{\pi}{6}\right) =$$

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$$r_v\left(\overset{u}{\frac{\pi}{3}}, \overset{v}{\frac{\pi}{6}}\right) = \left(0,\ \frac{\sqrt{3}}{2},\ 0\right)$$

c)

$$r_u\left(\frac{\pi}{3}, \frac{\pi}{6}\right) \times r_v\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \begin{vmatrix} \quad \end{vmatrix}$$

Rješenje

$$A \rightsquigarrow u=\frac{\pi}{3},\ \ v=\frac{\pi}{6}$$

$$\boxed{r(u,v)=\big(\sin u,\ \sin v,\ \sin(u+v)\big)}$$

a)

$$r\left(\overset{u}{\frac{\pi}{3}},\overset{v}{\frac{\pi}{6}}\right)=\left(\sin\frac{\pi}{3},\ \sin\frac{\pi}{6},\ \sin\left(\frac{\pi}{3}+\frac{\pi}{6}\right)\right)$$

$$r\left(\frac{\pi}{3},\frac{\pi}{6}\right)=\left(\sin\frac{\pi}{3},\ \sin\frac{\pi}{6},\ \sin\frac{\pi}{2}\right)$$

$$r\left(\frac{\pi}{3},\frac{\pi}{6}\right)=\left(\frac{\sqrt{3}}{2},\ \frac{1}{2},\ 1\right)$$

$$A\left(\frac{\sqrt{3}}{2},\ \frac{1}{2},\ 1\right)$$

b)

$$r_u=\big(\cos u,\ 0,\ \cos(u+v)\big)$$

$$r_v=\big(0,\ \cos v,\ \cos(u+v)\big)$$

$$r_u\left(\overset{u}{\frac{\pi}{3}},\overset{v}{\frac{\pi}{6}}\right)=\left(\frac{1}{2},\ 0,\ 0\right)$$

$$r_v\left(\overset{u}{\frac{\pi}{3}},\overset{v}{\frac{\pi}{6}}\right)=\left(0,\ \frac{\sqrt{3}}{2},\ 0\right)$$

c)

$$r_u\left(\frac{\pi}{3},\frac{\pi}{6}\right)\times r_v\left(\frac{\pi}{3},\frac{\pi}{6}\right)=\begin{vmatrix}\vec{i} & \vec{j} & \vec{k}\\ & & \\ & & \end{vmatrix}$$

Rješenje

$$A \rightsquigarrow u = \frac{\pi}{3}, \; v = \frac{\pi}{6}$$

$$\boxed{r(u,v) = \big(\sin u, \, \sin v, \, \sin(u+v)\big)}$$

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$$r_u\left(\frac{\pi}{3}, \frac{\pi}{6}\right) \times r_v\left(\frac{\pi}{3}, \frac{\pi}{6}\right) = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{1}{2} & 0 & 0 \\ & & \end{vmatrix}$$

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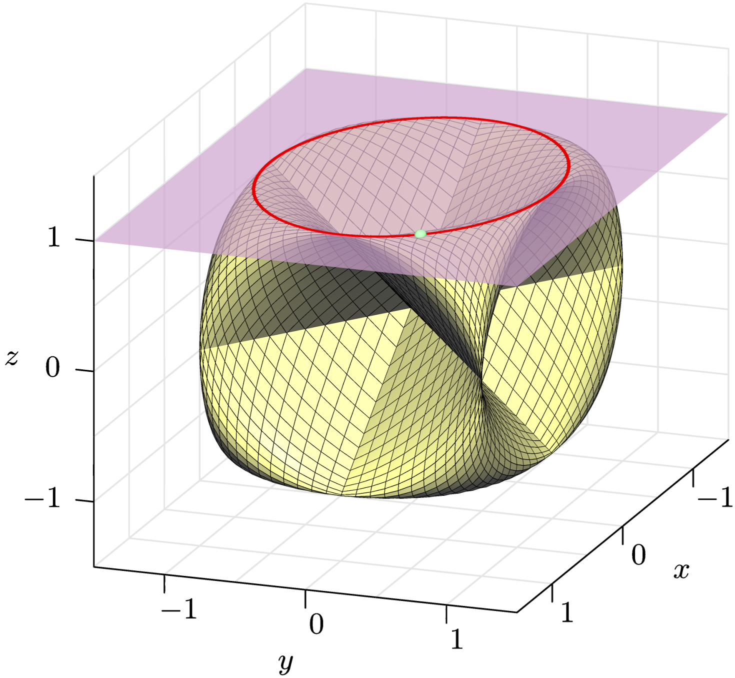
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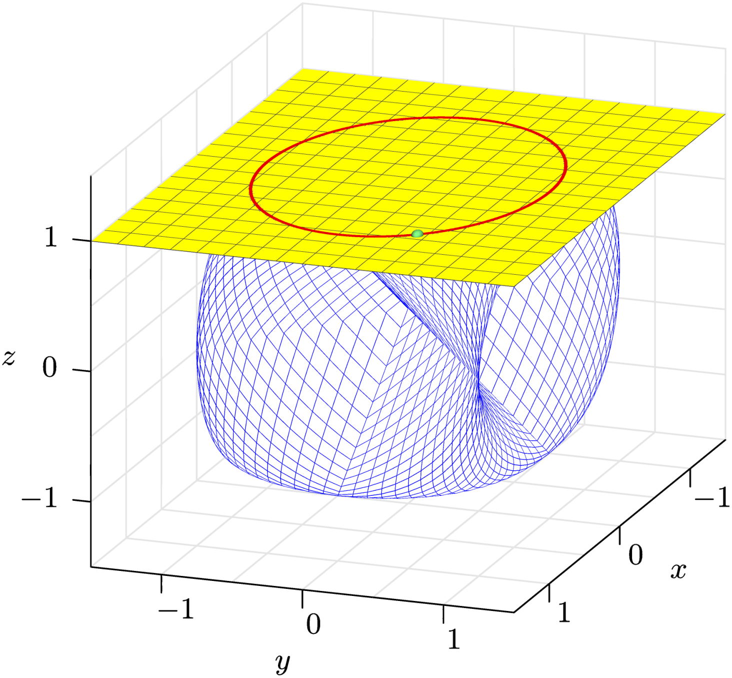
0
−1
z
−1
0
1
y
−1
0
1
x



z
1
0
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y
−1
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x
−1
0
1

peti zadatak

Zadatak 5

Susjedne stranice pravokutnika imaju duljine 10 *cm i* 24 *cm. Kako će se promijeniti duljina dijagonale tog pravokutnika ako prvu stranicu produljimo za* 4 *mm, a drugu stranicu skratimo za* 1 *mm? Usporedite približnu promjenu dobivenu pomoću diferencijala sa stvarnom promjenom.*

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Rješenje

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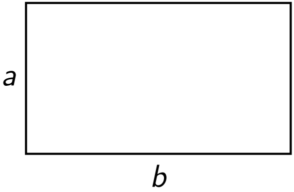
Rješenje



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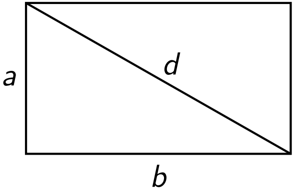

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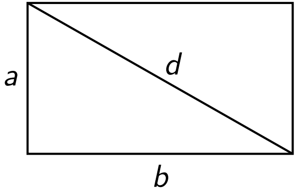

$$d = \sqrt{a^2 + b^2}$$

Zadatak 5

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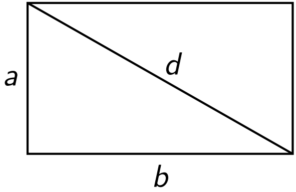

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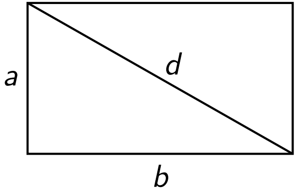

$$d = \sqrt{a^2 + b^2}$$

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$$x = 10\,\text{cm},$$

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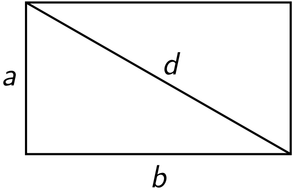

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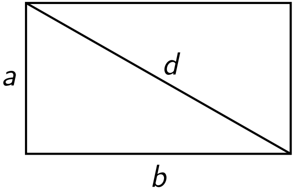

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$$(10, 24)$$

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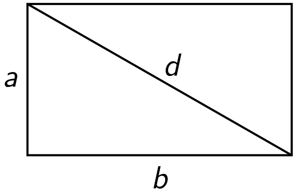

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$$(\overset{x}{10}, \overset{y}{24})$$

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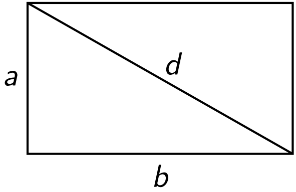

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$$(\overset{x}{10}, \overset{y}{24})$$

$$\Delta x = 0.4\,\text{cm},$$

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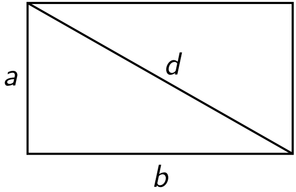

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$$\Delta x = 0.4\,\text{cm}, \quad \Delta y = -0.1\,\text{cm}$$

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točna promjena dijagonale

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$$\Delta f =$$

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$$\Delta f=f(x+\Delta x,y+\Delta y)$$

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točna promjena dijagonale

$$\Delta f = f(x+\Delta x, y+\Delta y) -$$

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točna promjena dijagonale

$$\Delta f = f(x+\Delta x, y+\Delta y)-f(x,y)$$

$$f(x, y) = \sqrt{x^2 + y^2}, \quad x = 10,\ y = 24, \quad \Delta x = 0.4,\ \Delta y = -0.1$$

točna promjena dijagonale

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$$\Delta f = f(x+\Delta x, y+\Delta y) - f(x,y)$$

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približna promjena dijagonale

$$f(x,y)=\sqrt{x^2+y^2}, \quad x=10,\ y=24, \quad \Delta x=0.4,\ \Delta y=-0.1$$

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približna promjena dijagonale

$$\frac{\partial f}{\partial x} =$$

$$f(x,y)=\sqrt{x^2+y^2},\quad x=10,\ y=24,\quad \Delta x=0.4,\ \Delta y=-0.1$$

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približna promjena dijagonale

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$$\boxed{\left(\sqrt{x}\right)'=\frac{1}{2\sqrt{x}}}$$

$$f(x,y) = \sqrt{x^2+y^2}, \quad x = 10, \; y = 24, \quad \Delta x = 0.4, \; \Delta y = -0.1$$

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približna promjena dijagonale

$$\frac{\partial f}{\partial x}=\frac{1}{2\sqrt{x^2+y^2}}\cdot 2x$$

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$$\frac{\partial f}{\partial x} = \frac{1}{2\sqrt{x^2+y^2}} \cdot 2x = \frac{x}{\sqrt{x^2+y^2}}$$

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približna promjena dijagonale

$$\frac{\partial f}{\partial x}=\frac{1}{2\sqrt{x^2+y^2}}\cdot 2x=\frac{x}{\sqrt{x^2+y^2}}$$

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približna promjena dijagonale

$$\frac{\partial f}{\partial x} = \frac{1}{2\sqrt{x^2 + y^2}} \cdot 2x = \frac{x}{\sqrt{x^2 + y^2}}$$

$$\frac{\partial f}{\partial y} = \frac{1}{2\sqrt{x^2 + y^2}} \cdot 2y = \frac{y}{\sqrt{x^2 + y^2}}$$

$$\left(\sqrt{x}\right)' = \frac{1}{2\sqrt{x}}$$

$$f(x,y)=\sqrt{x^2+y^2},\quad x=10,\ y=24,\quad \Delta x=0.4,\ \Delta y=-0.1$$

točna promjena dijagonale

$$\Delta f = f(x+\Delta x, y+\Delta y)-f(x,y)$$

$$\Delta f = f(10.4, 23.9)-f(10,24)$$

$$\Delta f = \sqrt{10.4^2+23.9^2}-\sqrt{10^2+24^2}$$

$$\Delta f = \sqrt{679.37}-\sqrt{676}$$

$$\boxed{\Delta f = 0.064727\cdots}$$

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$$\Delta f \approx \frac{x}{\sqrt{x^2+y^2}}\,\mathrm{d}x +$$

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$$\Delta f\approx \underline{\hspace{3cm}}$$

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$$\Delta f\approx 0.061538\cdots$$

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