Scatterplots

TIME SERIES ANALYSIS IN R

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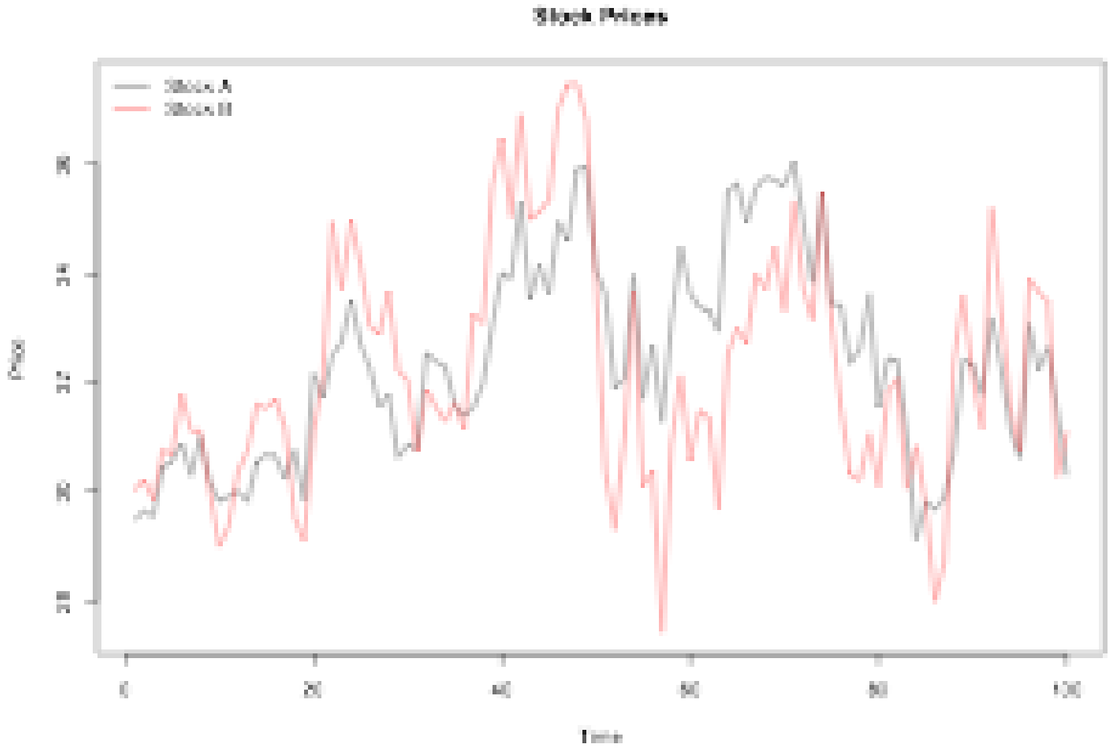
datacamp

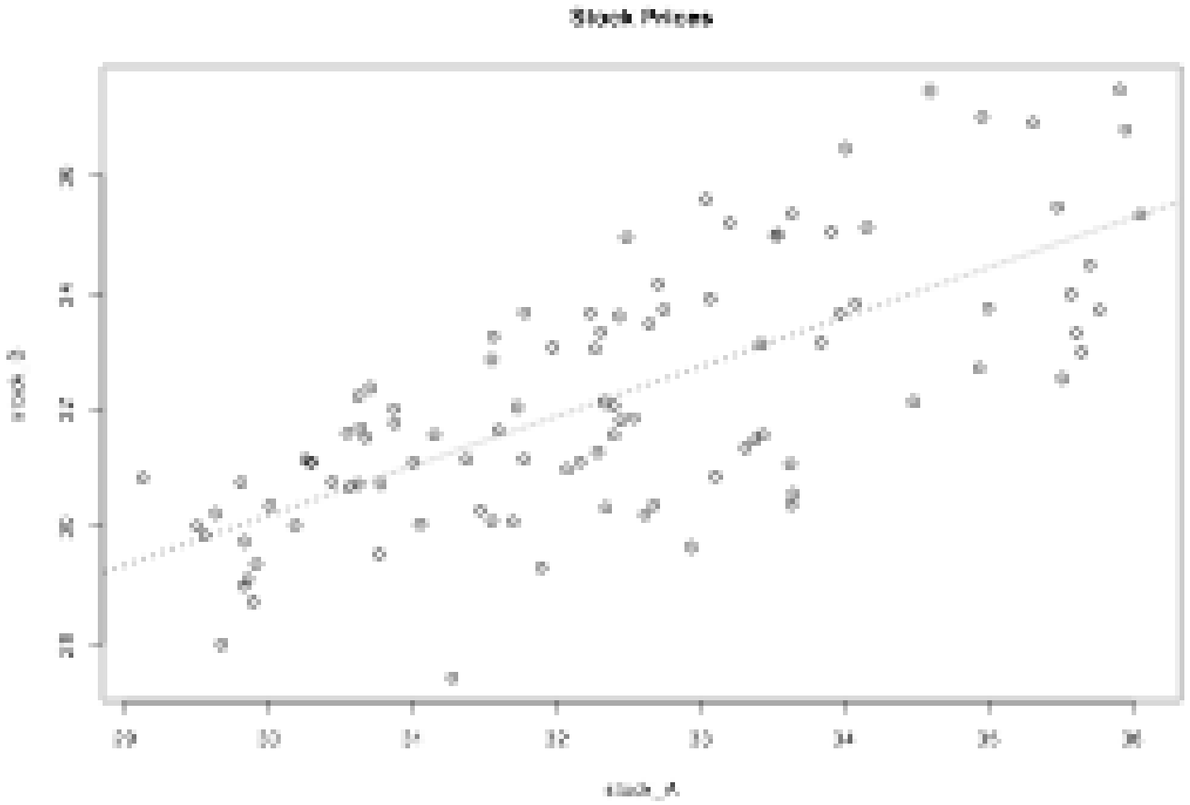
Stock prices: stock A and B over time

```
ts.plot(cbind(stock_A, stock_B))
```



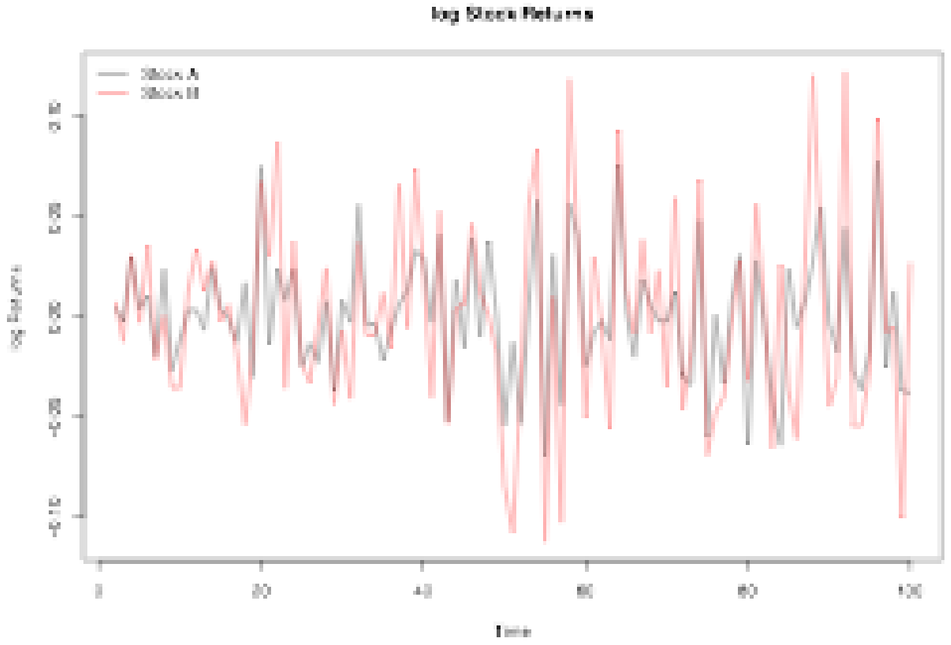
Stock prices: scatterplot of stock B vs. A

```
plot(stock_A, stock_B)
```



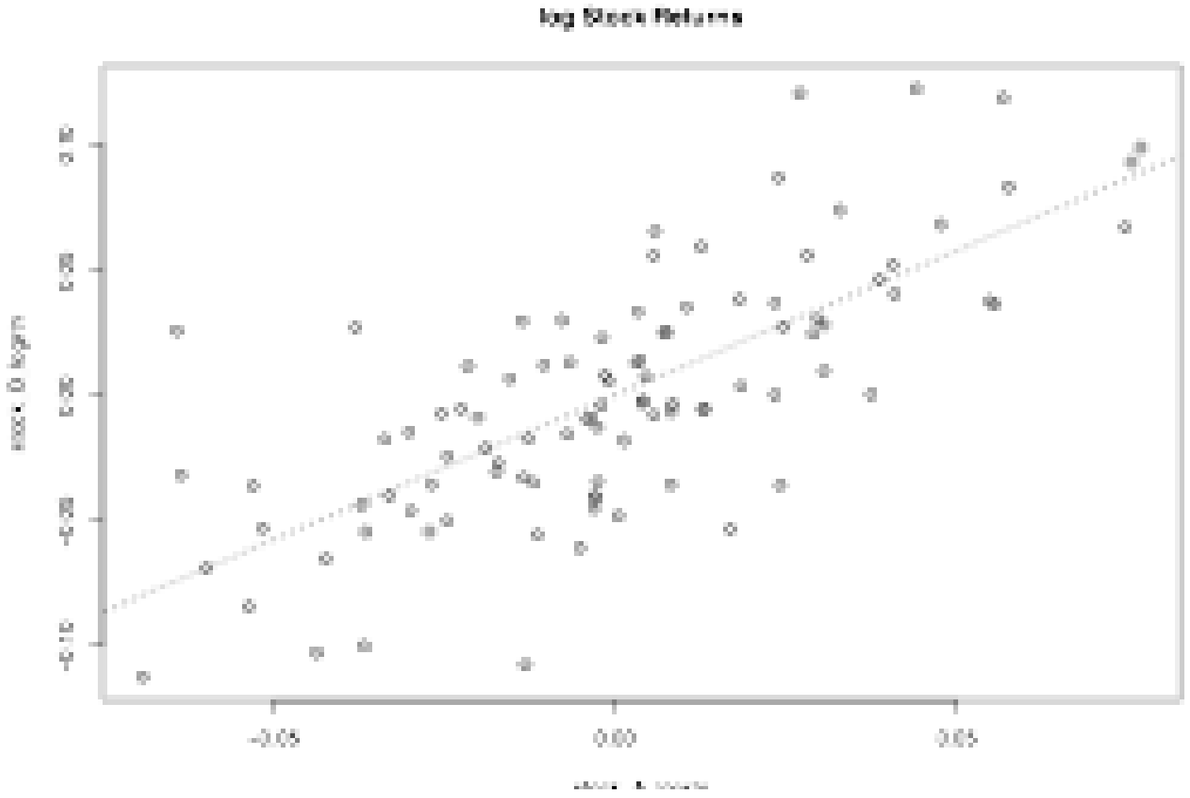
Log returns for stock A and B

```
stock_A_logreturn = diff(log(stock_A))
stock_B_logreturn = diff(log(stock_B))
ts.plot(cbind(stock_A_logreturn, stock_B_logreturn))
```



Scatterplot of stock B vs A log returns

```
plot(stock_A_logreturn, stock_B_logreturn)
```



Let's practice!

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Covariance and correlation

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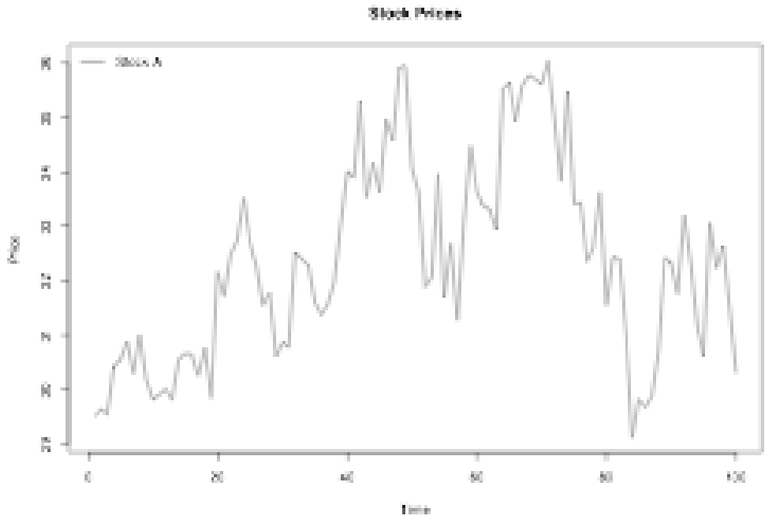
Stock prices for stock A

```
mean(stock_A)
```

```
32.36
```

```
sd(stock_A)
```

```
1.83
```



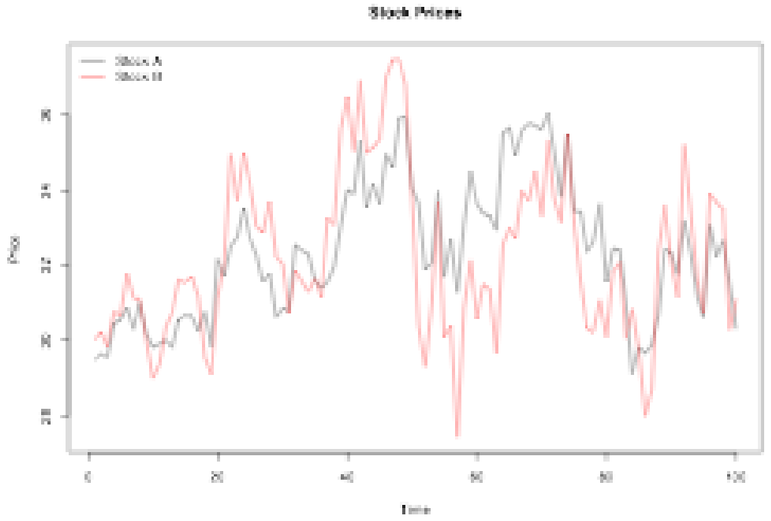
Stock prices for stock B

```
mean(stock_B)
```

```
32.30
```

```
sd(stock_B)
```

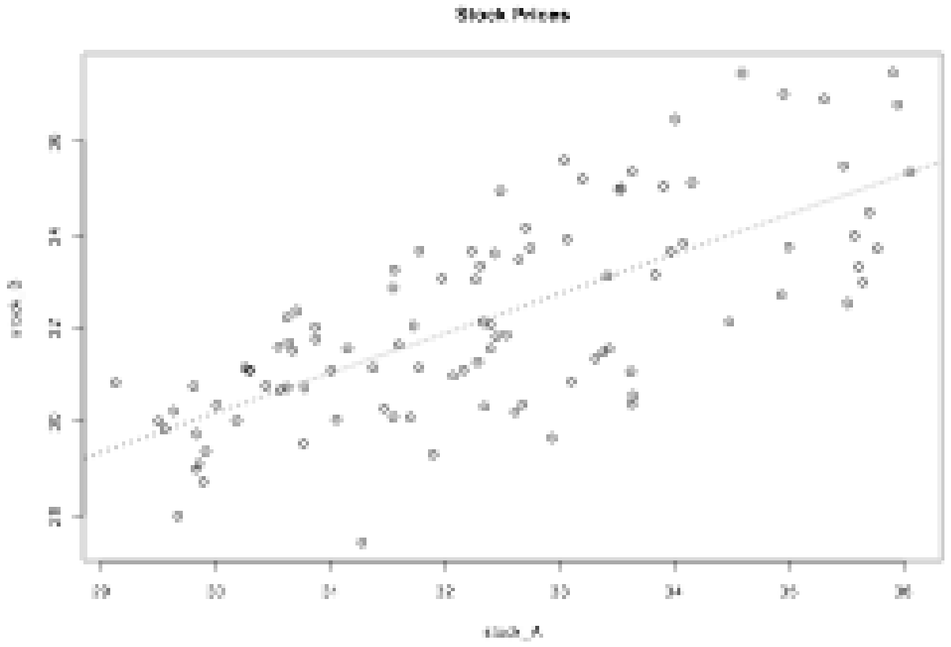
```
2.17
```



Covariance of stock A and B

```
cov(stock_A, stock_B)
```

```
2.86
```



Correlations

- Standardized version of covariance
- **+1**: perfectly positive linear relationship
- **-1**: perfectly negative linear relationship
- **0**: no linear association

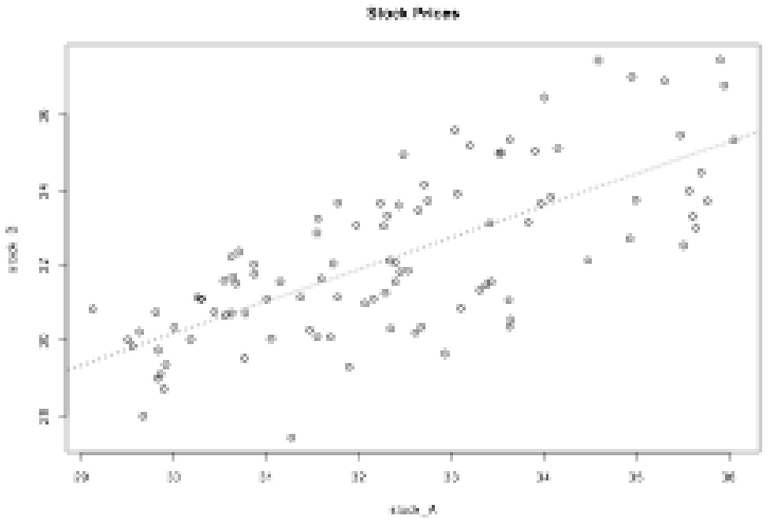
Correlation of stock A and B

```
cor(stock_A, stock_B)
```

```
0.71
```

```
cov(stock_A, stock_B) /
(sd(stock_A) * sd(stock_B))
```

```
0.71
```



Covariance and correlation: log returns

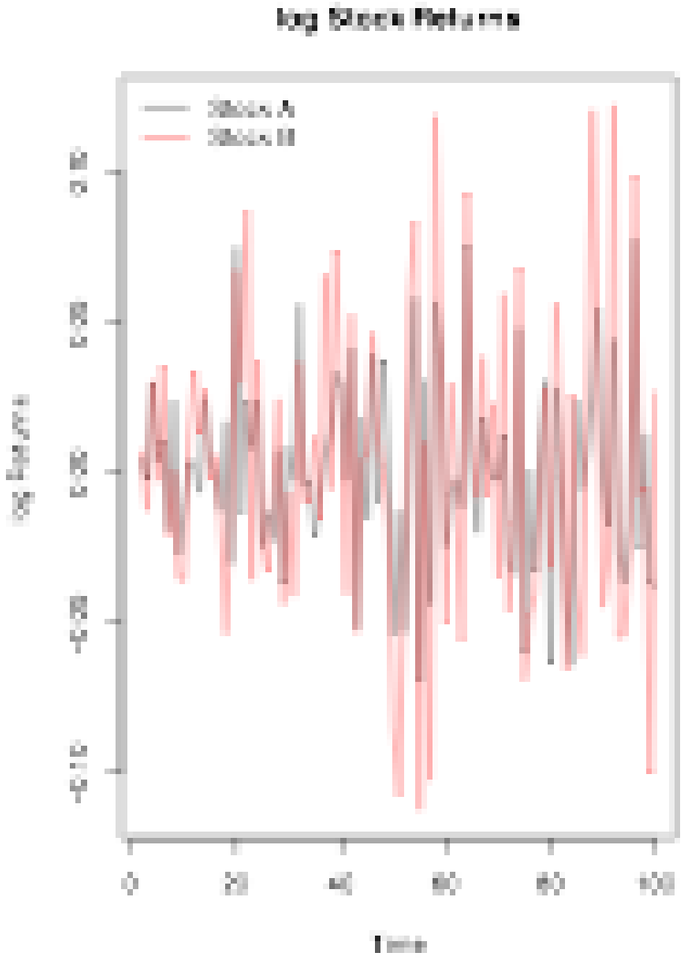
```
cov(stock_A_logreturn, stock_B_logreturn)
```

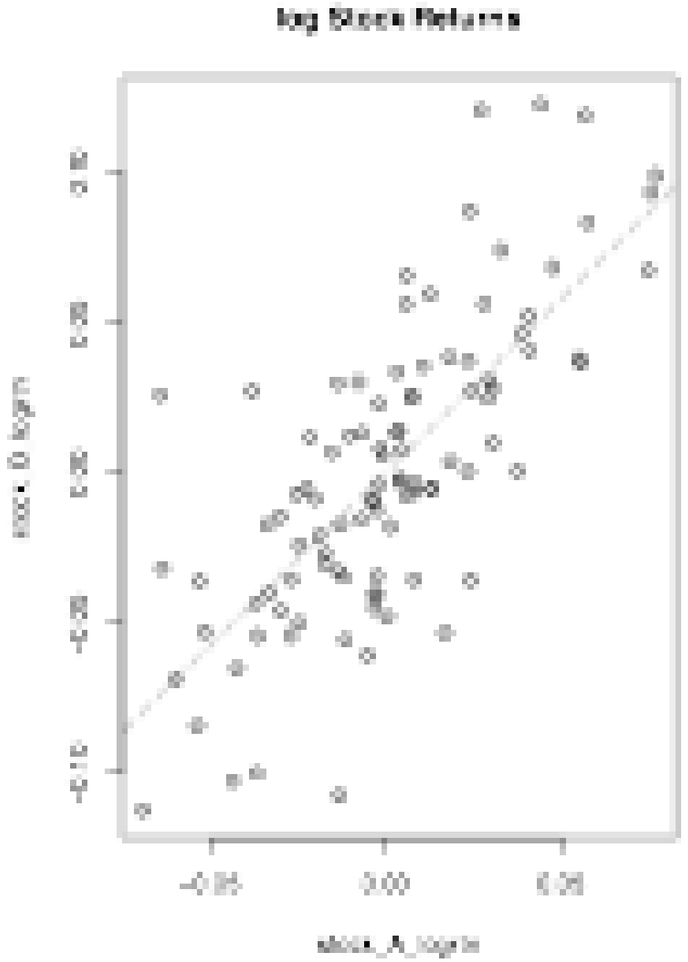
```
0.001
```

```
cor(stock_A_logreturn, stock_B_logreturn)
```

```
0.74
```

Covariance and correlation: log returns





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Autocorrelation

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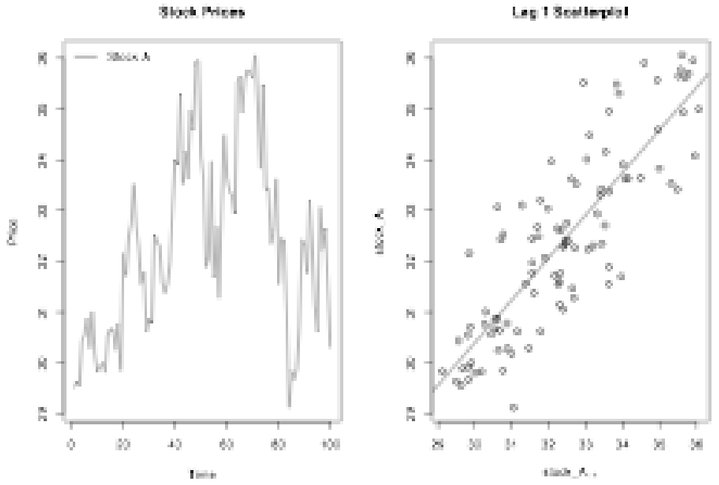
Autocorrelation - I

```
# Lag 1 Autocorrelation:
# Correlation of stock A "today" and stock A "yesterday"
cor(stock_A[-100], stock_A[-1])
```

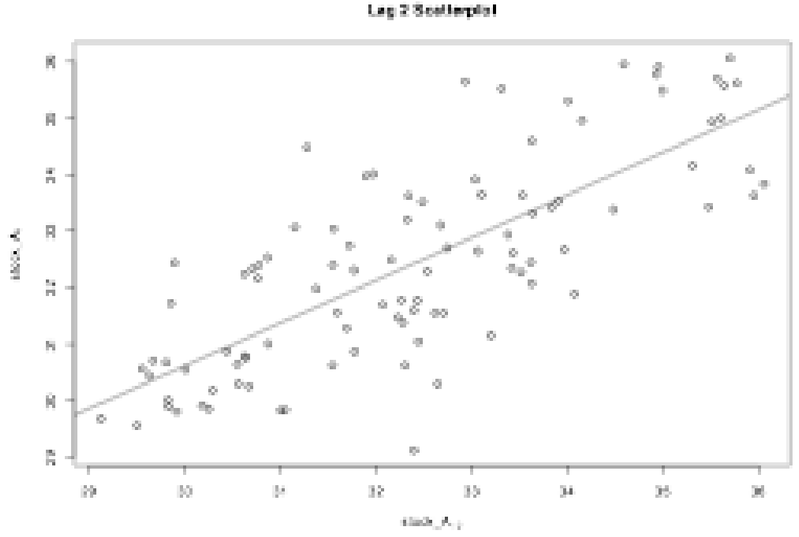
```
0.84
```



Autocorrelation - II

```
# Lag 2 Autocorrelation:
# Correlation of Stock A “today” and stock A “Two Days Earlier”
cor(stock_A[-(99:100)],stock_A[-(1:2)])
```

```
0.76
```



Autocorrelations at lag 1 and 2 - I

```
cor(stock_A[-100],stock_A[-1])
```

```
0.84
```

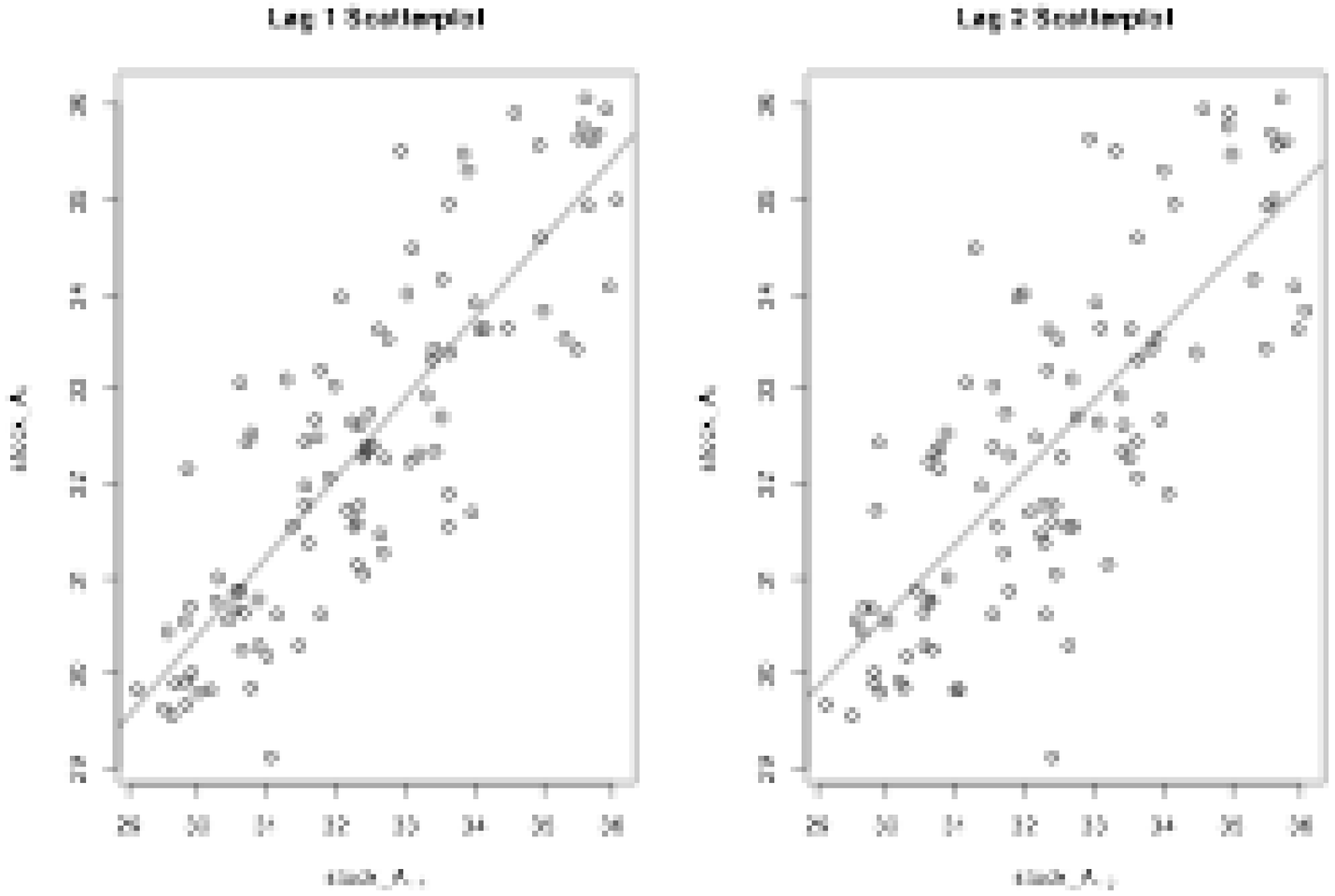
```
cor(stock_A[-(99:100)],stock_A[-(1:2)])
```

```
0.76
```

```
acf(stock_A, lag.max = 2, plot = FALSE)
```

```
Autocorrelations of series ‘stock_A’, by lag
  1    2
0.84  0.76
```

Autocorrelations at lag 1 and 2 - II



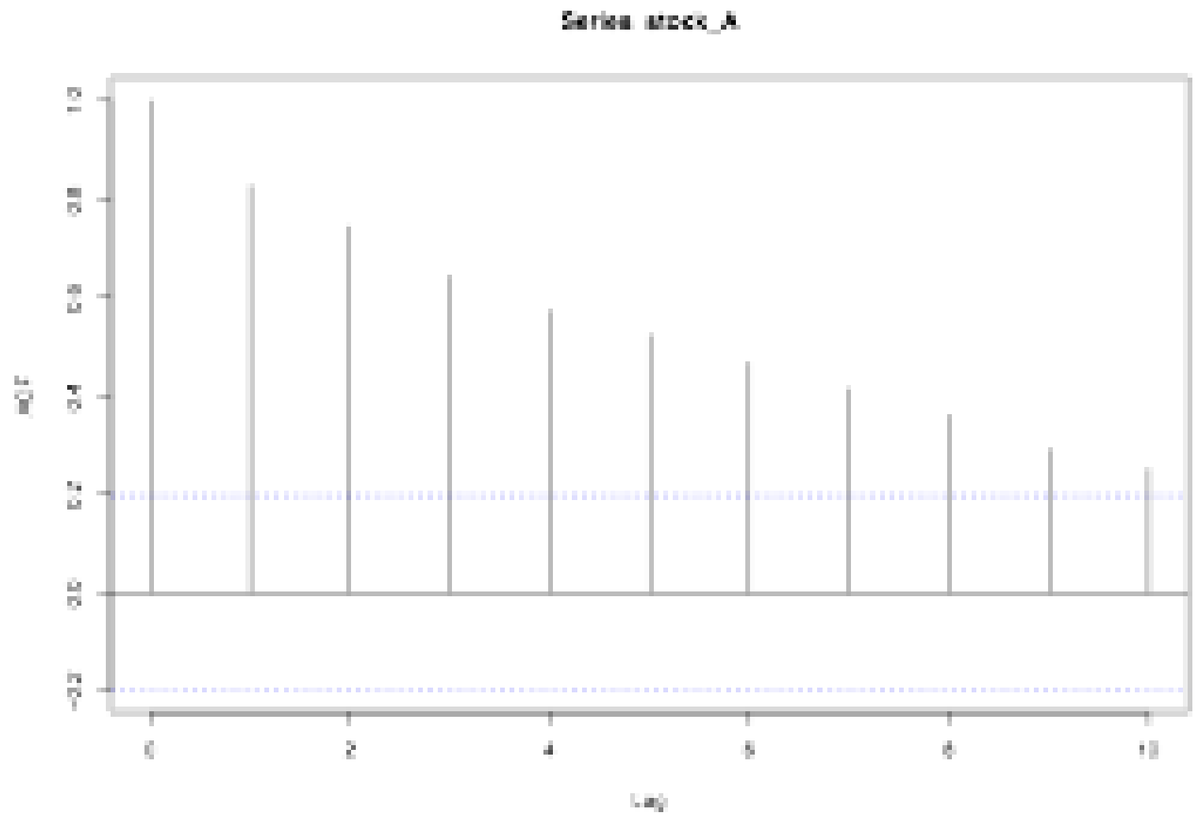
The autocorrelation function - I

```
# Autocorrelation by lag: “The Autocorrelation Function”
(ACF)acf(stock_A, plot = FALSE)
```

```
Autocorrelations of series ‘stock_A’, by lag
  1    2    3    4    5    6    7    8    9   10
0.84 0.76 0.64 0.57 0.52 0.46 0.41 0.36 0.29 0.25
```

The autocorrelation function - II

```
acf(stock_A, plot = TRUE)
```



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