02441 Applied Statistics and Statistical Software

Exercise 1A - Climate

The dataset clima contains yearly average temperatures in Denmark and Greenland for the last hundred years.

| Variable name	Description
time	Year
denmark	Average temperature in Denmark
greenland	Average temperature in Greenland

1. Plot the two time series and compute the correlation. What is the conclusion?

Start by loading the data (make sure datafile is present in working directory)

```
climate <- read.csv('clima.txt', header = TRUE, sep = '\t')
```
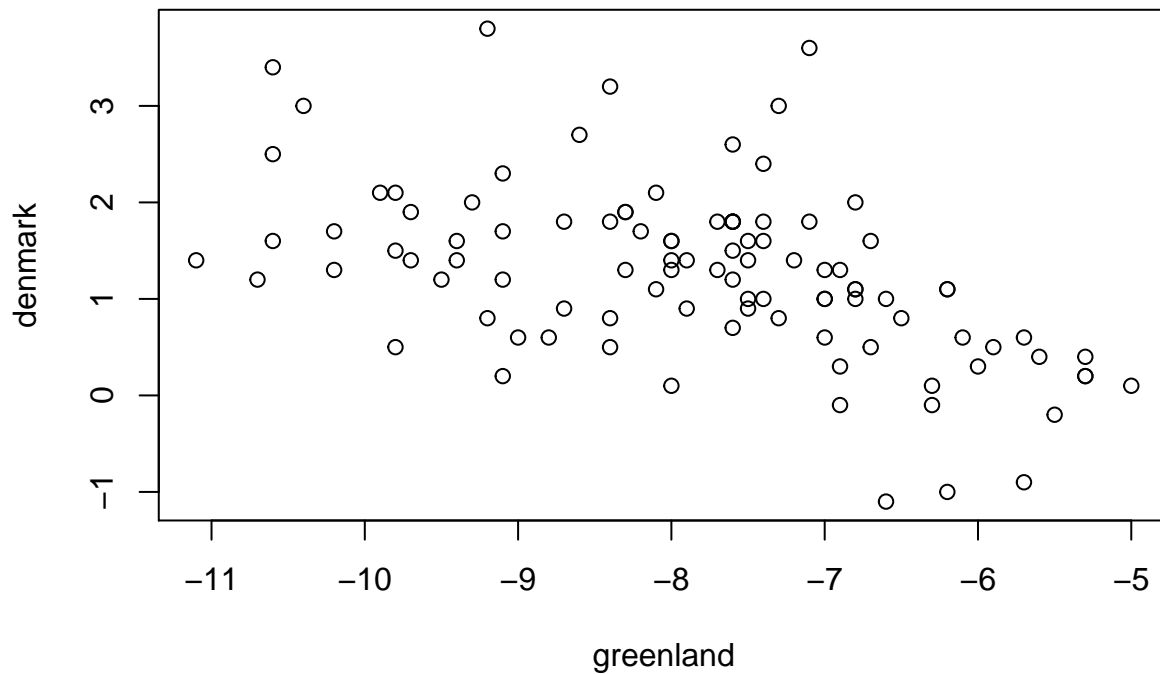
Use the plot command in R to plot data

```
par(mfrow=c(1,2))
plot(denmark~time, data=climate, col='red')
plot(greenland~time, data=climate, col='blue')
```
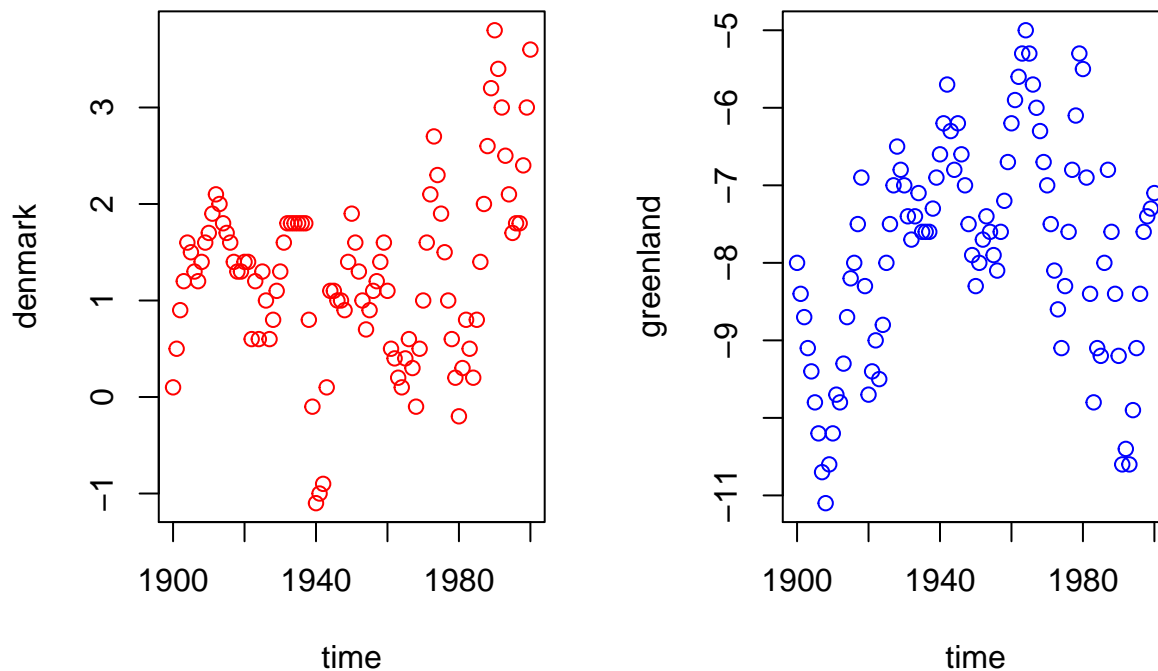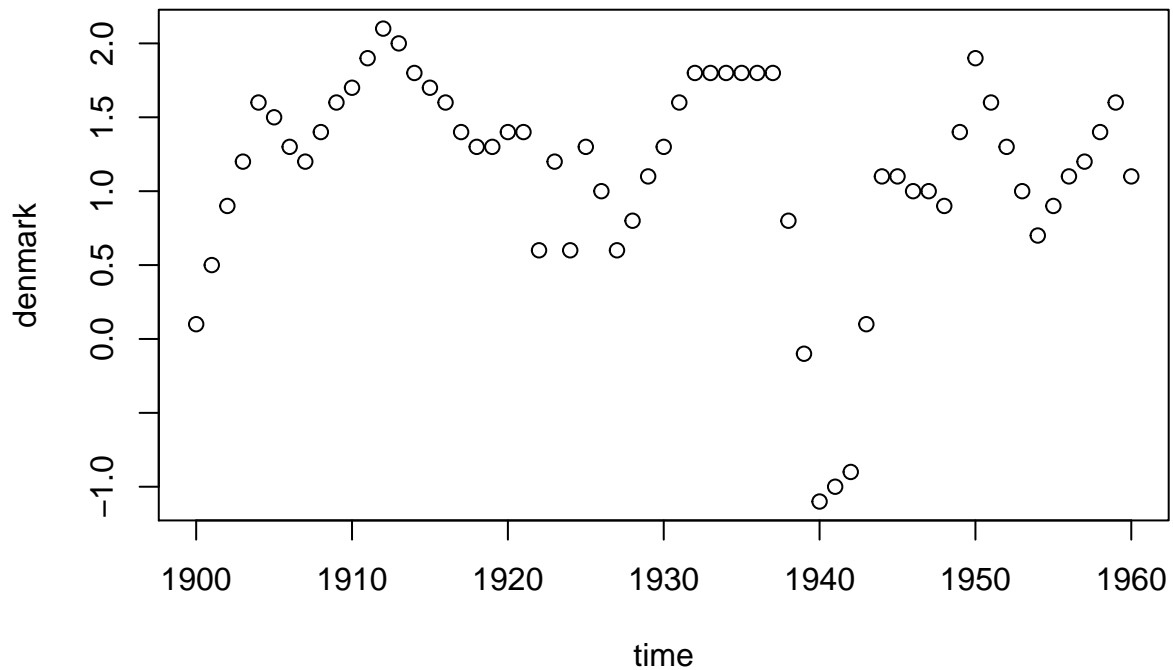

Plot Temperatures of Greenland and Denmark up against eachother to explore the relation between these two

```
plot(denmark~greenland, data=climate)
```

2 Is the temperature in Denmark increasing when considering the time series 1900-1960?

```
plot(denmark~time, data=climate[climate$time<=1960,])
```



```
cor.test(climate$time[climate$time<=1960], climate$denmark[climate$time<=1960],
         alternative = "two.sided")
```

```
##
##  Pearson's product-moment correlation
```
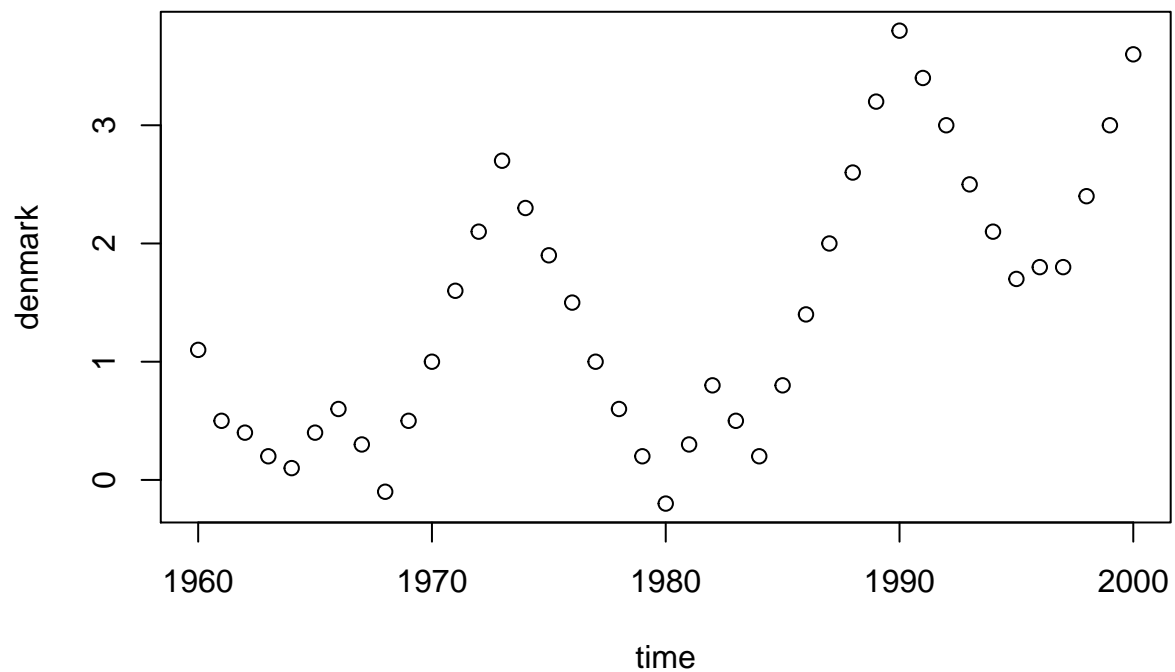
```
## 
## data:  climate$time[climate$time <= 1960] and climate$denmark[climate$time <= 1960]
## t = -1.3809, df = 59, p-value = 0.1725
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.41046976  0.07837465
## sample estimates:
##        cor
## -0.1769382
```

```r
summary(lm(climate$denmark[climate$time<=1960]~climate$time[climate$time<=1960]))
```

```
## 
## Call:
## lm(formula = climate$denmark[climate$time <= 1960] ~ climate$time[climate$time <=
##     1960])
## 
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.1780 -0.1294  0.1201  0.4444  0.8900
## 
## Coefficients:
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                     14.260920   9.498005   1.501    0.139
## climate$time[climate$time <= 1960] -0.006795   0.004921  -1.381    0.173
## 
## Residual standard error: 0.6767 on 59 degrees of freedom
## Multiple R-squared:  0.03131,    Adjusted R-squared:  0.01489
## F-statistic: 1.907 on 1 and 59 DF,  p-value: 0.1725
```

3 Is the temperature in Denmark increasing when considering the time series 1960-2000?

```r
plot(denmark~time, data=climate[climate$time>=1960,])
```

```r
cor.test(climate$time[climate$time>=1960], climate$denmark[climate$time>=1960],
         alternative = "two.sided")
```

```
##
##  Pearson's product-moment correlation
##
## data:  climate$time[climate$time >= 1960] and climate$denmark[climate$time >= 1960]
## t = 5.2996, df = 39, p-value = 4.847e-06
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.4237344 0.7961950
## sample estimates:
##       cor
## 0.6470359
```