Homework 18

1. Scatter plot from 11.3
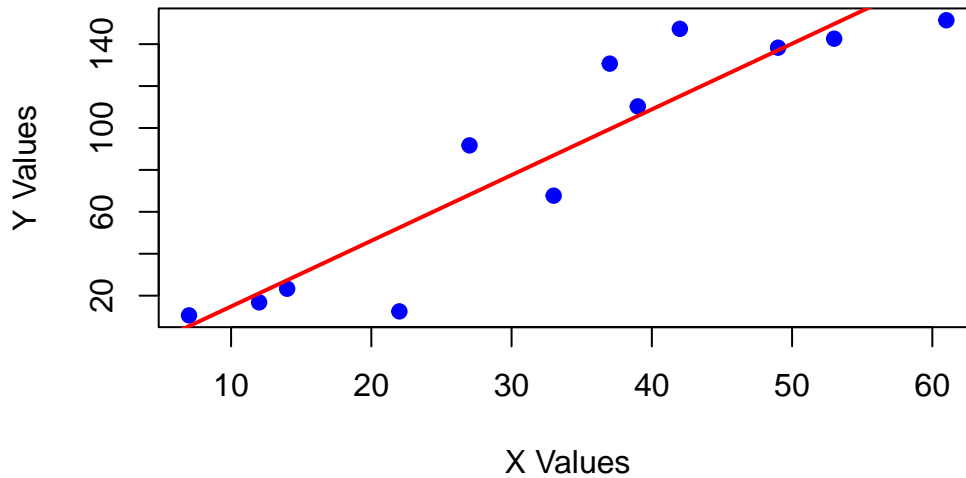
```r
data = read.delim("ex11-3.txt", sep = ",", header = TRUE)
xValues = data$X.x.
yValues = data$X.y.

plot(xValues, yValues,
     main = "Scatter Plot with Least Squares Regression Line",
     xlab = "X Values",
     ylab = "Y Values",
     pch = 19, col = "blue")

model = lm(yValues ~ xValues)

abline(model, col = "red", lwd = 2)
```

Scatter Plot with Least Squares Regression Line


```
summary(model)
```

```
Call:
lm(formula = yValues ~ xValues)

Residuals:
    Min      1Q  Median      3Q     Max
-39.954 -10.076  -1.432   9.766  32.156

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -16.5054    14.8382  -1.112    0.292
xValues       3.1345     0.4029   7.780  1.5e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 22.82 on 10 degrees of freedom
Multiple R-squared:  0.8582,	Adjusted R-squared:  0.844
F-statistic: 60.53 on 1 and 10 DF,  p-value: 1.502e-05
```

2. Exercise 11.22

```
values = read.delim("ex11-22.txt", sep = ",", header = TRUE)
treadmillTime = values$X.Treadmill.
raceTime  = values$X.10.K.

# a
plot(treadmillTime, raceTime,
     main = "Scatter Plot of Treadmill Time vs Race Time",
     xlab = "Treadmill Time (minutes)",
     ylab = "Race Time (minutes)",
     pch = 19, col = "blue")

# b
model = lm(raceTime ~ treadmillTime)
abline(model, col = "red", lwd = 2)
```

Scatter Plot of Treadmill Time vs Race Time
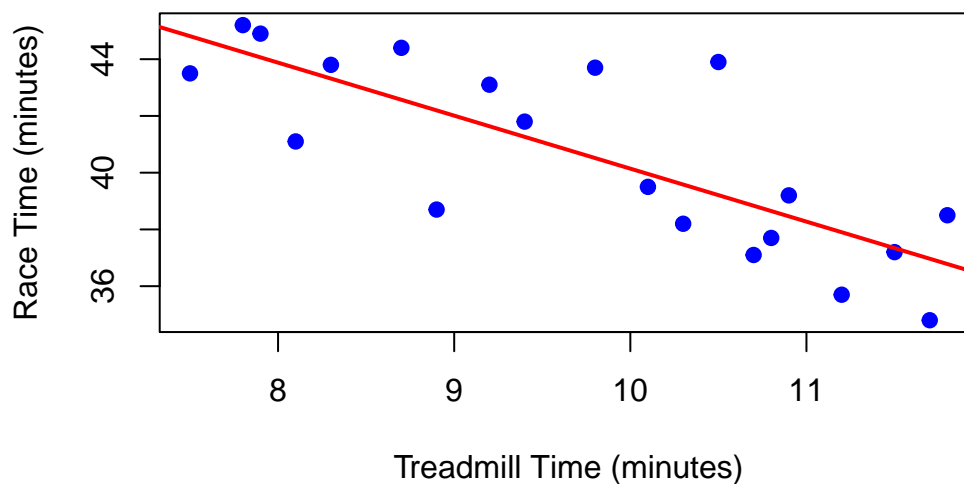

```
# c
summary(model)
```

```
Call:
lm(formula = raceTime ~ treadmillTime)

Residuals:
```

```
     Min       1Q  Median       3Q      Max
-3.4966 -1.4706   0.1708   1.0779   4.6912


Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)   58.8158     3.4100  17.248 1.22e-12 ***
treadmillTime -1.8673     0.3462  -5.393 3.99e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Residual standard error: 2.102 on 18 degrees of freedom
Multiple R-squared:  0.6177,    Adjusted R-squared:  0.5965
F-statistic: 29.09 on 1 and 18 DF,  p-value: 3.994e-05
```

```
b0 = coef(model)[1]  # Intercept
b1 = coef(model)[2]  # Slope
```

b. Multiple R-squared shows that it's a good model.

c. The estimated regression model is: $\hat{y} = 58.8158 + -1.8673x$