Stat 482

Homework Set #1 Solutions

(1.) $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$,

where
$$\varepsilon_1, ..., \varepsilon_n \sim iid\ N(0, \sigma^2)$$

(2.) β_1 is the difference in mean muscle mass from a 1 year increase in age.

(3.) $\hat{Y} = 156.35 - 1.19 X$

(4.) $\hat{\sigma}^2 = 66.8$, $\hat{\sigma} = 8.17$

(5.) see graph

(6.) Muscle mass shows a general linear (decreasing) trend as a function of age, so a linear regression model is appropriate.

HW #1 Computing

Data from Exercise 1.27

A sample of women is selected to investigate the relationship between age (x) and muscle mass (y)

:

```
hw1.data = read.table(
'http://users.stat.ufl.edu/~rrandles/sta4210/Rclassnotes/data/textdatasets/Ku
tnerData/Chapter%20%201%20Data%20Sets/CH01PR27.txt'
  )
colnames(hw1.data)=c("muscle.mass","age")
```

```
hw1.mod = lm(muscle.mass ~ age, data=hw1.data)
```

```
hw1.mod$coefficients
```

```
## (Intercept)         age
##  156.346564   -1.189996
```

```
e = hw1.mod$residuals
n = length(e)
sse = sum(e^2)
mse = sse / (n-2)
sigma.hat = sqrt(mse)
```

```
mse
```

```
## [1] 66.80082
```

```
sigma.hat
```

```
## [1] 8.173177
```

```r
plot(hw1.data$age,hw1.data$muscle.mass,type = "p",xlab = "age",ylab = "muscle
mass")
abline(hw1.mod)
```