



R Code for Examples in the book
"Statistics: The Art and Science of Learning from Data"
 by Agresti, Franklin and Klingenberg, 5th edition

Chapter 13

Example 4: Female Athletes' Weight – Estimating Residual Standard Deviation

Reading in data

```
data <-
read.csv(file='https://raw.githubusercontent.com/artofstat/data/master/Chapter13/college_female_athletes.csv')
colnames(data) #check column names

## [1] "TBW"      "HGT"      "X.BF"      "BF"      "LBM"      "REPS55"
## [7] "REPS70"   "X1RM"     "X1RM.TBW" "X1RM.LBM" "AGE"
```

Fitting in multiple regression model

```
lin.reg <- lm(TBW ~ HGT + BF + AGE ,data = data)
lin.reg

##
## Call:
## lm(formula = TBW ~ HGT + BF + AGE, data = data)
##
## Coefficients:
## (Intercept)      HGT      BF      AGE
##   -97.6938     3.4285    136.4265    -0.9601
```

To get the ANOVA table for the regression model

```
aov <- anova(lin.reg)
aov # viewing ANOVA table

## Analysis of Variance Table
##
## Response: TBW
##      Df Sum Sq Mean Sq F value    Pr(>F)
## HGT    1 10281.1  10281.1  100.6140 1.904e-14 ***
## BF      1  1902.7   1902.7   18.6203 6.054e-05 ***
## AGE     1    224.1    224.1    2.1933  0.1438
## Residuals 60  6131.0    102.2
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
rss <- aov$`Sum Sq`[4]  
df_error <- aov$Df[4]
```

To estimate standard deviation

```
s <- sqrt(rss / df_error)  
s
```

```
## [1] 10.10861
```