



R Code for Examples in the book

"Statistics: The Art and Science of Learning from Data"

by Agresti, Franklin and Klingenberg, 5th edition

Chapter 12

Example 15: Maximum Bench Press – Confidence and Prediction Intervals

Reading in data

```
data <-
read.csv(file='https://raw.githubusercontent.com/artofstat/data/master/Chapter12/highschool_female_athletes.csv')
colnames(data) #check column names

## [1] "Athlete"          "BP60"             "maxBP..lbs."
## [4] "LP200"            "maxLP..lbs."      "Situps..per.minute."
## [7] "X40YD..sec."      "VerticalJump..in." "SitReach..in."
## [10] "MB..in."           "SR..sec."         "Age"
## [13] "Height..in."       "Weight..lbs."      "Bodyfat...."
## [16] "BMI"               "Sport"
```

Fitting regression model

```
lin.reg <- lm(maxBP..lbs. ~ BP60, data = data)
summary(lin.reg)

##
## Call:
## lm(formula = maxBP..lbs. ~ BP60, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -17.9205  -5.9027  -0.7237   5.4989  19.0973
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  63.5369     1.9565  32.475  < 2e-16 ***
## BP60         1.4911     0.1497   9.958  6.48e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.003 on 55 degrees of freedom
## Multiple R-squared:  0.6432, Adjusted R-squared:  0.6368
## F-statistic: 99.17 on 1 and 55 DF, p-value: 6.481e-14
```

To find a 95% confidence for the population mean for $x = 11$

```
predict(lin.reg, newdata = data.frame(BP60 = 11),  
        interval='confidence', se.fit = TRUE)
```

```
## $fit  
##      fit      lwr      upr  
## 1 79.93844 77.81405 82.06283  
##  
## $se.fit  
## [1] 1.060051  
##  
## $df  
## [1] 55  
##  
## $residual.scale  
## [1] 8.003188
```

To find a 95% prediction interval for a single observation of $x = 11$

```
predict(lin.reg, newdata = data.frame(BP60 = 11),  
        interval='prediction')
```

```
##      fit      lwr      upr  
## 1 79.93844 63.75961 96.11727
```