STA 506 2.0 Linear Regression Analysis

3 October 2020

The systolic blood pressure is thought to be related to the weight of an individual. The weight and systolic blood pressure of 15 randomly selected males in the age group 30 - 40 are shown below.

```
weight <- c(185, 187, 180, 155, 212, 175, 190, 210, 200, 190,
            168, 189, 190, 172, 189, 168, 174, 183, 155, 195,
            180, 143, 240, 235, 192, 197)
SBP <- c(148, 151, 146, 139, 159, 144, 150, 155, 152, 149, 141,
         150, 150, 143, 150, 143, 145, 147, 136, 154, 146,
         133, 169, 165, 150, 153)
data <- data.frame(weight, SBP)
data
```

```
   weight SBP
1     185 148
2     187 151
3     180 146
4     155 139
5     212 159
6     175 144
7     190 150
8     210 155
9     200 152
10    190 149
11    168 141
12    189 150
13    190 150
14    172 143
15    189 150
16    168 143
17    174 145
18    183 147
19    155 136
20    195 154
21    180 146
22    143 133
23    240 169
24    235 165
25    192 150
26    197 153
```

1. Make a scatterplot of the data.
2. Estimate the correlation coefficient.
3. Fit a simple linear regression model with intercept to the data.

4. Test the hypothesis $H_0 : \beta_1 = 0$ vs $H_0 : \beta_1 \neq 0$
5. Construct the analysis-of-variance table and test for significance of regression.
6. Find a 95% confidence interval on the slope and the intercept and interpret the confidence intervals.
7. Fit a no-intercept model to the data and compare it to the model obtained above. Which model you conclude is superior?