Group 8 - Lab 6

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Problem 2.11

Consider the weight and blood pressure data in Problem 2.10. Fit a no - intercept model to the data and compare it to the model obtained in Problem 2.10. Which model would you conclude is superior?

```r
# Reading in the information for Weight and Symbolic BP
dat=read.csv("C:\\Users\\Nick\\Documents\\0_Spring 2019\\Applied Regression\\Labs_HW\\Data_Sets\\Chapte
y = dat[,2]
x = dat[,1]
n = length(x)

# Calculating variables
Sxx = sum(x^2) - sum(x)^2 / n
Sxy = sum(x*y) - sum(x)*sum(y) / n

B1H = Sxy / Sxx
B0H = mean(y) - mean(x)*B1H

yH = B0H + sort(x) * B1H

SSr = B1H * Sxy
SSres = sum((y - mean(y))^2) - SSr

SSt = SSr + SSres
MSres = SSres / (n-2)

seB1H = sqrt(MSres/Sxx)
seB0H = sqrt(MSres * (1 / n + mean(x)^2 / Sxx))

MSr = SSr/1

F0 = MSr / MSres


# Estimating the correlation coefficient
r = Sxy / sqrt(Sxx * SSt)
r
```

```
## [1] 0.7734903
```

```r
R2 = SSr / SSt
R2
```

```
## [1] 0.5982872
```

```r
summary(lm(y~x))
```

```
##
## Call:
## lm(formula = y ~ x)
```

```
## 
## Residuals:
##     Min      1Q  Median      3Q     Max
## -17.182  -6.485  -2.519   8.926  12.143
## 
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 69.10437   12.91013   5.353 1.71e-05 ***
## x            0.41942    0.07015   5.979 3.59e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 8.681 on 24 degrees of freedom
## Multiple R-squared:  0.5983, Adjusted R-squared:  0.5815
## F-statistic: 35.74 on 1 and 24 DF,  p-value: 3.591e-06
```

Interpretation of first model:

The MSE for the first model is "0.5982872".

Setting up the no-intercept model:

```
summary(lm(y~x-1))
```

```
## 
## Call:
## lm(formula = y ~ x - 1)
## 
## Residuals:
##     Min      1Q  Median      3Q     Max
## -26.245  -0.902   6.170  10.254  16.838
## 
## Coefficients:
##   Estimate Std. Error t value Pr(>|t|)
## x  0.79164    0.01343   58.97   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 12.6 on 25 degrees of freedom
## Multiple R-squared:  0.9929, Adjusted R-squared:  0.9926
## F-statistic:  3477 on 1 and 25 DF,  p-value: < 2.2e-16
```
```
MSE2 = 12.6^2
```

Interpretation:

Comparing the two models we can see:

The model with no intercept:

$$\hat{y} = 0.792x$$

With an MSE of "158.76".

The model with an intercept:

$$\hat{y} = \text{"}69.1043728\text{"} + \text{"}0.4194152\text{"} * x$$

with an MSE of "0.5982872".

The test on $\hat{\beta}_0$ is significant. Therefore, the first model would be the better of the two to use.