# HW6

Nikhil Gopal

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```
setwd("C:/Users/d/Google Drive/Notability/Applied Linear Regression Analysis/psets/6")

data <- read.csv("week6.csv", header = FALSE)

names(data)[1] <- "Brain.Weight"
names(data)[2] <- "Body.Weight"
data[1,1] <- 3.385
```

**A**

```
#A
linear_model <- lm(data$Brain.Weight ~ data$Body.Weight)
```

**B**

```
#B
#variance is residual standard error^2
summary(linear_model)
```

```
##
## Call:
## lm(formula = data$Brain.Weight ~ data$Body.Weight)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1552.25    -8.00    47.36    55.10  1553.42
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -56.85555   42.97805  -1.323    0.191
## data$Body.Weight   0.90291    0.04453  20.278   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 323.5 on 60 degrees of freedom
## Multiple R-squared:  0.8727, Adjusted R-squared:  0.8705
## F-statistic: 411.2 on 1 and 60 DF,  p-value: < 2.2e-16
```

Variance = 323.5

**C**

```
linear_model
```

```
##
## Call:
## lm(formula = data$Brain.Weight ~ data$Body.Weight)
##
## Coefficients:
##      (Intercept)  data$Body.Weight
##         -56.8555            0.9029
```

Slope = 0.90291 Intercept = -56.8555

**D**

```
#D
summary(linear_model)
```

```
##
## Call:
## lm(formula = data$Brain.Weight ~ data$Body.Weight)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1552.25    -8.00    47.36    55.10  1553.42
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)      -56.85555   42.97805  -1.323    0.191
## data$Body.Weight   0.90291    0.04453  20.278   <2e-16 ***
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## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 323.5 on 60 degrees of freedom
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```

Standard error of slope: 0.04453 Standard error of intercept: 42.97805

**E**

Yi = (0.90291 * Xi) - 56.8555 Estimate = -55.04968

**F**

Standard error = 323.5

**G**

```
#G
sterr <- 323.5

#pt function is t distribution
pvalue <- 2*pt(abs(sterr), df = 60, lower.tail = FALSE)

pvalue
```

```
## [1] 5.698862e-99
```

The p value for this test was less than 0.001. Thus, we can safely say that the conditional expectation = 3.

**H**

```
#H
#SSE = Residual Standard Error
#SST = sum((data$Brain.Weight - mean(data$Brain.Weight))^2)

SST = NULL

summary_model <- summary(linear_model)

SSE = summary_model$sigma^2 * 60
#SSR = SST - SSE
SSR = NULL

R2 <- summary_model$r.squared

MSE = SSE/(62-2)
MSR = SSR/1

SST
```

```
## NULL
```

```
SSR
```

```
## NULL
```

```
SSE
```

```
## [1] 6279999
```

```
MSE
```

```
## [1] 104666.7
```

```
MSR
```

```
## numeric(0)
```

For the above question I commented out the SSR/SST lines, for some reason R was giving me an error with the formatting of the data, but I am confident that I have the correct method for generating those values with the commented out lines for this question. Would like to follow up in office hours.