POLI706: Advanced Methods of Political Analysis

Problem set 5

Exercise 1

For this exercise we will use the `cats` dataset from the `MASS` package. You should use `?cats` to learn about the background of this dataset.

```
library(MASS)
data(cats)
```

a. Fit the following simple linear regression model in `R`. Use heart weight as the response and body weight as the predictor.

$$Y_i = \beta_0 + \beta_1 x_i + \epsilon_i$$

Store the results in a variable called `cat_model`. Use a t test to test the significance of the regression. Report the following:

b. The null and alternative hypotheses

c. The value of the test statistic

d. The p-value of the test

e. A statistical decision at $\alpha = 0.05$

f. A conclusion in the context of the problem

```
cat_model = lm(Hwt ~ Bwt, data = cats);
summary(cat_model)
```

Exercise 2

What are β_0, β_1, $\hat{\beta}_0$, $\hat{\beta}_1$, x, x_i, u, $\hat{u}_i$ in output of simple linear regression from the Exercise 1?

Exercise 3

Explain under which circumstances you will get a large slope coefficient estimates when you run a regression model.