Problem Set 2

lalonde <- read.csv("lalonde.csv", header = TRUE)  
attach(lalonde)  
  
install.packages("lmtest")  
library(lmtest)  
  
install.packages("sandwich")  
library(sandwich)

#### 1.

prob1 <- lm(re78 ~ treat)  
summary(prob1)

Average Treatment Effect: 1793.6 S.E.: 632.9 Confidence Interval: (553.116, 3034.084)

#### 2.

coeftest(prob1, vcov = sandwich)

Average Treatment Effect: 1793.61 S.E.: 669.33 Confidence Interval: (481.7232, 3105.4968)

#### 3.

**i)**

True

Given that

E(u∣X) = 0,

Definition of Covariance,

Cov(X,u) = E[(X − E[X])(u − E[u])]

= E[Xu − XE[u] − E[X]u + E[X]E[u]]

= E[Xu] − E[X]E[u] − E[X]E[u] + E[X]E[u]

= E[Xu] − E[X]E[u]

= E[Xu] − E[X]E[E[u∣X]]

= E[Xu] − E[X]E[0]

= E[Xu]

= E[E[Xu∣X]]

= E[XE[u∣X]]

= E[X\*0]

= E[0]

= 0

**ii)**

False

For,

E[uX] = 0,

unless all values of u = 0,

E[u2X2]

will always result in a positive number as both values are being squared.

**iii)**

True

E(u∣X)

E[uX3]

= E[E[X3u∣X]

= E[X3E[u∣X]

= E[X3\*0]

= 0

#### 4.

**i)**

= 0.950664121

= 6.256849733

**ii)**

ui = Y - - X

= 0.943644

**iii)**

E[X] = 31.47/24 = 1.31125

E[Y] = 219.719/24 = 9.15495833333

ui = Y - - X

= 9.15495833333 - 0.950664121 - 6.256849733\*1.31125

ui = 0

0.950664121 + 6.256849733\*100 - 0

Total Consumption = 626.6356374 thousand pounds

#### 5.

**i)**

Given,

Using the chain rule, where u =

we get

and

for ,

for ,

**ii)**

is the same

for , from the previous problem we had

using these steps,

shows that

**iii)**

is equivalent to