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# Load data

rm(list = ls())
library(car)
setwd("/Users/raz/Dropbox/14.31 edX Building
the Course/Problem Sets/PSET 9")
nlsw88 <- read.csv('nlsw88.csv')

#covariance
cov_yx <- cov(nlsw88$lwage, nlsw88$yrs_school)
var_x <- var(nlsw88$yrs_school)
hatbeta1_0 <- cov_yx / var_x
print(hatbeta1_0)

#simple linear regression
single <- lm(lwage ~ yrs_school, data =
nlsw88)
summary(single) # show results
coefficients(single) # model coefficients
ci <- confint(single, level=0.9)
ci
resid <- residuals(single) # residuals
sum(resid)

#dummy variables
meanother <- mean(nlsw88$lwage[nlsw88$black ==
0])
meanblack <- mean(nlsw88$lwage[nlsw88$black ==
1])
meanother
meanblack - meanother

dummymodel <- lm(lwage ~ black, data = nlsw88)
summary(dummymodel)

#multivariable regression
multi <- lm(lwage ~ yrs_school + ttl_exp, data
= nlsw88)
summary(multi) # show results
anova_unrest <- anova(multi)

#Restricted model
nlsw88$newvar <- nlsw88$yrs_school +
2*nlsw88$ttl_exp
restricted <- lm(lwage ~ newvar, data =
nlsw88)
summary(restricted) # show results
anova_rest <- anova(restricted)

#Test
statistic_test <- (((anova_rest$`Sum Sq`[2]-
anova_unrest$`Sum Sq`[3])/1)
/(((anova_unrest$`Sum
Sq`[3])/anova_unrest$Df[3]))
statistic_test
pvalue <- df(statistic_test, 1,
anova_unrest$Df[3])
pvalue

matrixR <- c(0, -2, 1)
linearHypothesis(multi, matrixR)

```