Chapter 4 - Inference

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Exercise 4.6

Upload packages

```
library(lmreg)
library(wooldridge)
library(car)
```

Upload database

```
data<-wooldridge::wage2
```

Use the data in WAGE2.RAW for this exercise.

(i) Consider the standard wage equation

$$log(wage) = \beta_0 + \beta_1 educ + \beta_2 exper + \beta_3 tenure + u$$

State the null hypothesis that another year of general workforce experience has the same effect on `log(wage)` as another year of `tenure` with the current employer.

In this case, the null hypothesis is expressed as follows

$H_0 : \beta_2 - \beta_3 = 0$ and the alternative hypothesis given by $H_1 : \beta_2 - \beta_3 \neq 0$

(ii) Test the null hypothesis in part (i) against a two-sided alternative, at the 5% significance level, by constructing a 95% confidence interval. What do you conclude?

```
lm1<-lm(lwage~educ+exper+tenure, data)

summary(lm1)
```

```
##
## Call:
## lm(formula = lwage ~ educ + exper + tenure, data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.8282 -0.2401  0.0203  0.2569  1.3400
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 5.496696   0.110528  49.731  < 2e-16 ***
## educ        0.074864   0.006512  11.495  < 2e-16 ***
## exper       0.015328   0.003370   4.549 6.10e-06 ***
## tenure      0.013375   0.002587   5.170 2.87e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3877 on 931 degrees of freedom
## Multiple R-squared:  0.1551, Adjusted R-squared:  0.1524
## F-statistic: 56.97 on 3 and 931 DF,  p-value: < 2.2e-16
```

Jointly hypothesis test

```
linearHypothesis(lm1, c("exper=1","tenure=-1"))
```

```
## Linear hypothesis test
##
## Hypothesis:
## exper = 1
## tenure = - 1
##
## Model 1: restricted model
## Model 2: lwage ~ educ + exper + tenure
##
##   Res.Df   RSS Df Sum of Sq     F    Pr(>F)
## 1    933 29145
## 2    931   140  2     29005 96469 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Hence, with base in the p-value of F-Test, we reject the null hypothesis that this two variables have the same effect on return of `log(wage)` .