Exercícios Práticos

```
require(wooldridge)
```

```
## Loading required package: wooldridge
```

C2

(i)

```
lwage <- log(wage2$wage)

reg1 <- lm(lwage ~ educ + exper + tenure + married + black + south + urban, data = wage2)

summary(reg1)
```

```
##
## Call:
## lm(formula = lwage ~ educ + exper + tenure + married + black +
##     south + urban, data = wage2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.98069 -0.21996  0.00707  0.24288  1.22822
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.395497   0.113225  47.653  < 2e-16 ***
## educ         0.065431   0.006250  10.468  < 2e-16 ***
## exper        0.014043   0.003185   4.409 1.16e-05 ***
## tenure       0.011747   0.002453   4.789 1.95e-06 ***
## married      0.199417   0.039050   5.107 3.98e-07 ***
## black       -0.188350   0.037667  -5.000 6.84e-07 ***
## south       -0.090904   0.026249  -3.463 0.000558 ***
## urban        0.183912   0.026958   6.822 1.62e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3655 on 927 degrees of freedom
## Multiple R-squared:  0.2526, Adjusted R-squared:  0.2469
## F-statistic: 44.75 on 7 and 927 DF,  p-value: < 2.2e-16
```

A diferença percentual entre os salários de negros e não negros é de aproximadamente 18,8%. Além disso, é estatisticamente significante.

(ii)

```r
exper2 <- (wage2$exper)^2

tenure2 <- (wage2$tenure)^2


reg2 <- lm(lwage ~ educ + exper + tenure + married + black + south + urban + exper2 + tenure2, data = wa

r2.ir <- summary(reg2)$r.squared

r2.r <- summary(reg1)$r.squared

F <- (r2.ir - r2.r) / (1 - r2.ir) * (925/2)

F
```

```
## [1] 1.489806
```

```r
qf(1-0.2,2,925)
```

```
## [1] 1.612241
```

(iii)

```r
reg3 <- lm(lwage ~ educ + exper + tenure + married + black + south + urban + black*educ, data = wage2)

summary(reg3)
```

```
##
## Call:
## lm(formula = lwage ~ educ + exper + tenure + married + black +
##     south + urban + black * educ, data = wage2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.97782 -0.21832  0.00475  0.24136  1.23226
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.374817   0.114703  46.859  < 2e-16 ***
## educ         0.067115   0.006428  10.442  < 2e-16 ***
## exper        0.013826   0.003191   4.333 1.63e-05 ***
## tenure       0.011787   0.002453   4.805 1.80e-06 ***
## married      0.198908   0.039047   5.094 4.25e-07 ***
## black        0.094809   0.255399   0.371 0.710561
## south       -0.089450   0.026277  -3.404 0.000692 ***
## urban        0.183852   0.026955   6.821 1.63e-11 ***
## educ:black  -0.022624   0.020183  -1.121 0.262603
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3654 on 926 degrees of freedom
## Multiple R-squared:  0.2536, Adjusted R-squared:  0.2471
## F-statistic: 39.32 on 8 and 926 DF,  p-value: < 2.2e-16
```

(iv)

```
reg4 <- lm(lwage ~ educ + exper + tenure + married + black + south + urban, data = wage2)

summary(reg4)
```

```
##
## Call:
## lm(formula = lwage ~ educ + exper + tenure + married + black +
##     south + urban, data = wage2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.98069 -0.21996  0.00707  0.24288  1.22822
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.395497   0.113225  47.653  < 2e-16 ***
## educ         0.065431   0.006250  10.468  < 2e-16 ***
## exper        0.014043   0.003185   4.409 1.16e-05 ***
## tenure       0.011747   0.002453   4.789 1.95e-06 ***
## married      0.199417   0.039050   5.107 3.98e-07 ***
## black       -0.188350   0.037667  -5.000 6.84e-07 ***
## south       -0.090904   0.026249  -3.463 0.000558 ***
## urban        0.183912   0.026958   6.822 1.62e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3655 on 927 degrees of freedom
## Multiple R-squared:  0.2526, Adjusted R-squared:  0.2469
## F-statistic: 44.75 on 7 and 927 DF,  p-value: < 2.2e-16
```

C8

(i)

O sinal de β_1 será positivo.

(ii)

```
reg5 <- lm(approve ~ white, data = loanapp)

summary(reg5)
```

```
##
## Call:
## lm(formula = approve ~ white, data = loanapp)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.90839  0.09161  0.09161  0.09161  0.29221
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)  0.70779    0.01824   38.81   <2e-16 ***
## white        0.20060    0.01984   10.11   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3201 on 1987 degrees of freedom
## Multiple R-squared:  0.04893,    Adjusted R-squared:  0.04845
## F-statistic: 102.2 on 1 and 1987 DF,  p-value: < 2.2e-16
```

Ele é estatisticamente significante e grande do ponto de vista prático, sendo 20% mais provável que brancos consigam emprestímo do que não brancos.

(iii)

```
reg6 <- lm(approve ~ white + hrat + obrat + loanprc + unem + male + married + dep + sch + cosign + chis

summary(reg6)
```

```
##
## Call:
## lm(formula = approve ~ white + hrat + obrat + loanprc + unem +
##     male + married + dep + sch + cosign + chist + pubrec + mortlat1 +
##     mortlat2 + vr, data = loanapp)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.06482  0.00781  0.06387  0.13673  0.71105
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.936731   0.052735  17.763  < 2e-16 ***
## white        0.128820   0.019732   6.529 8.44e-11 ***
## hrat         0.001833   0.001263   1.451   0.1469
## obrat       -0.005432   0.001102  -4.930 8.92e-07 ***
## loanprc     -0.147300   0.037516  -3.926 8.92e-05 ***
## unem        -0.007299   0.003198  -2.282   0.0226 *
## male        -0.004144   0.018864  -0.220   0.8261
## married      0.045824   0.016308   2.810   0.0050 **
## dep         -0.006827   0.006701  -1.019   0.3084
## sch          0.001753   0.016650   0.105   0.9162
## cosign       0.009772   0.041139   0.238   0.8123
## chist        0.133027   0.019263   6.906 6.72e-12 ***
## pubrec      -0.241927   0.028227  -8.571  < 2e-16 ***
## mortlat1    -0.057251   0.050012  -1.145   0.2525
## mortlat2    -0.113723   0.066984  -1.698   0.0897 .
## vr          -0.031441   0.014031  -2.241   0.0252 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3021 on 1955 degrees of freedom
##   (18 observations deleted due to missingness)
## Multiple R-squared:  0.1656, Adjusted R-squared:  0.1592
## F-statistic: 25.86 on 15 and 1955 DF,  p-value: < 2.2e-16
```

A *dummy white* continua estatisticamente significante, reduzindo seu peso para 13%.

(iv)

```
reg7 <- lm(approve ~ white + hrat + obrat + loanprc + unem + male + married + dep + sch + cosign + chis

summary(reg7)
```

```
##
## Call:
## lm(formula = approve ~ white + hrat + obrat + loanprc + unem +
##     male + married + dep + sch + cosign + chist + pubrec + mortlat1 +
##     mortlat2 + vr + white * obrat, data = loanapp)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.05523  0.01253  0.06320  0.12692  0.83284
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.180648   0.086808  13.601  < 2e-16 ***
## white       -0.145975   0.080263  -1.819 0.069109 .
## hrat         0.001790   0.001260   1.421 0.155521
## obrat       -0.012226   0.002216  -5.518 3.88e-08 ***
## loanprc     -0.152536   0.037436  -4.075 4.79e-05 ***
## unem        -0.007528   0.003189  -2.360 0.018352 *
## male        -0.006015   0.018817  -0.320 0.749241
## married      0.045536   0.016260   2.800 0.005154 **
## dep         -0.007630   0.006686  -1.141 0.253905
## sch          0.001777   0.016601   0.107 0.914787
## cosign       0.017709   0.041081   0.431 0.666458
## chist        0.129855   0.019227   6.754 1.90e-11 ***
## pubrec      -0.240325   0.028149  -8.538  < 2e-16 ***
## mortlat1    -0.062782   0.049891  -1.258 0.208400
## mortlat2    -0.126845   0.066891  -1.896 0.058071 .
## vr          -0.030540   0.013993  -2.183 0.029188 *
## white:obrat  0.008088   0.002290   3.531 0.000423 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3012 on 1954 degrees of freedom
##   (18 observations deleted due to missingness)
## Multiple R-squared:  0.1709, Adjusted R-squared:  0.1641
## F-statistic: 25.17 on 16 and 1954 DF,  p-value: < 2.2e-16
```

É significativo.

(v)

Será igual a -0,146 + 0,008*35 = 0,134.