Chapter 6 -

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Upload packages

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

Upload database

```
data<-wooldridge::hprice1

attach(data)
```

Use the data in HPRICE1.RAW for this exercise.

(i) Estimate the model

$$price = \beta_0 + \beta_1 lotsize + \beta_2 sqrft + \beta_3 bdrms + u$$

and report the results in the usual form, including the standard error of the regression. Obtain predicted price, when we plug in `lotsize` = 10,000, `sqrft` = 2,300, and `bdrms` = 4; round this price to the nearest dollar.

```
options(scipen=999) # To avoid scientific notation

summary(lm1<-lm(price~lotsize+sqrft+bdrms))
```

```
##
## Call:
## lm(formula = price ~ lotsize + sqrft + bdrms)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -120.026  -38.530   -6.555   32.323  209.376
##
## Coefficients:
##                Estimate  Std. Error t value           Pr(>|t|)
## (Intercept) -21.7703081  29.4750419  -0.739            0.46221
## lotsize       0.0020677   0.0006421   3.220            0.00182 **
## sqrft         0.1227782   0.0132374   9.275 0.0000000000000166 ***
## bdrms        13.8525217   9.0101454   1.537            0.12795
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 59.83 on 84 degrees of freedom
## Multiple R-squared:  0.6724, Adjusted R-squared:  0.6607
## F-statistic: 57.46 on 3 and 84 DF,  p-value: < 0.00000000000000022
```

The estimated equation is expressed as follows

$$\widehat{price} = -21.77 + 0.002lotsize + 0.122sqrft + 13.85bdrms$$

Substituing the values in the estimated equation, we have that

$$\widehat{price} = -21.77 + 0.002(10000) + 0.122(2300) + 13.85(4)$$

$$\widehat{price} = 335\ dollars$$

(ii) Run a regression that allows you to put a 95% confidence interval around the predicted value in part (i). Note that your prediction will differ somewhat due to rounding error.

Defining the transformed variables.

```
lotsize0<-lotsize-10000
sqrft0<-sqrft-2300
bdrms0<-bdrms-4
```

Regressing the transformed variables

```
summary(lm2<-lm(price~lotsize0+sqrft0+bdrms0))
```

```
##
## Call:
## lm(formula = price ~ lotsize0 + sqrft0 + bdrms0)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -120.026  -38.530   -6.555   32.323  209.376
##
## Coefficients:
##                Estimate  Std. Error t value             Pr(>|t|)
## (Intercept) 336.7066708   7.3744664  45.658 < 0.0000000000000002 ***
## lotsize0      0.0020677   0.0006421   3.220              0.00182 **
## sqrft0        0.1227782   0.0132374   9.275   0.0000000000000166 ***
## bdrms0       13.8525217   9.0101454   1.537              0.12795
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 59.83 on 84 degrees of freedom
## Multiple R-squared:  0.6724, Adjusted R-squared:  0.6607
## F-statistic: 57.46 on 3 and 84 DF,  p-value: < 0.00000000000000022
```

The confidence interval is given by

$$336.7 \pm 1.96(7.374)$$

Hence, the estimate lies in the interval [322.2,351.15].

(iii) Let $price^0$ be the unknown future selling price of the house with the characteristics used in parts (i) and (ii). Find a 95% CI for $price^0$ and comment on the width of this confidence interval.

In progress..