Assignment 3

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1 1

1.1 a

The expected increase, ceteris paribus, will be $\hat{\beta}_{bath} = 23.4$, where the units is \$1000. Therefore, it will be an expected increase of \$23,400, ceteris paribus, when a part of the home is converted to an additional bedroom.

1.2 b

The expected increase in the value of the house, with all other regressors aside held constant, when a new bathroom is added on will be $\hat{\beta}_{bath} + \hat{\beta}_{Hsize}(100) = 100(0.156) + 23.4 = 39$, and when scaled by \$1000 the expected associated increase ceteris paribus with the change will be \$39,000.

1.3 c

The loss, ceteris paribus, when the condition becomes poor will be $\hat{\beta}_{poor} = 48.8 \implies 48,800$ in home price.

1.4 d

Using the formula

$$\bar{R}^2 = 1 - \frac{(1-R^2)(n-1)}{n-k-1}$$

$$\implies 1 - R^2 = (1-0.72)(n-k-1)/(n-1)$$

$$1 - R^2 = (1-0.72)(220-6-1)/(200-1)$$

$$R^2 = 1 - \frac{(1-0.72)(220-6-1)}{199} \approx 0.70030150753$$

2 2

2.1 a

Form the t-statistic as

$$0.485/2.61 \approx 0.18582375478$$

Based on the t-statistic, there is support for the null at each of the three standard significance levels $\alpha = 0.05, 0.1, 0.01$. Therefore, because this t-statistic is far lower than the critical values at these significance levels (1.96, 2.58, 1.64 respectively), the null has to be accepted and cannot be rejected.

2.2 b

The fact that 5 bedroom homes sell much more than 2-bedroom houses can be consistent. In part (a) in the previous question, the ceteris paribus expected increase associated with one more bedroom is just \$458, but that is with all square footage of the house staying the same. Usually, 5-bedroom homes are much larger in square footage than 2-bedroom homes. The t-statistic of house size is very large, if the null hypothesis states that the coefficient on house size is zero ($0.156/0.011 \approx 14.1818181818$). This t-statistic beats the critical value of 2.58, and hence the null can be rejected using a significance level of 1%.

2.3 c

Confidence interval:

$$2000 \times (\hat{\beta}_{Lsize} \pm 2.58 \times \hat{se}_{Lsize}) = 2000 \times (0.002 \pm 2.58 \times 0.00048) \approx (1.52, 6.48)$$

$$\implies (\$1520, \$6480)$$

2.4 d

Another scale that might be appropriate will be squared feet in thousands. In this case, then the coefficient estimated on lot size, for example, will be scaled by multiplying 1000 to yield 2 and the coefficient on house size will be scaled upward to 156 instead of 0.156.

2.5 e

No, this is compared against the critical value of the F distribution, with numerator and denominator of 2, ∞ degrees of freedom, respectively. This value in magnitude is much smaller than the critical value at the 10% level, which was 2.30.