

Family (Last) Name \_\_\_\_\_

Given (First) Name Jerry

Student Number \_\_\_\_\_

f  
**STA 302613 Quiz 7A**

This quiz is based on your R printout from Question 2 of Assignment 7. This is the model in which crime rate is a function of the independent variables.

1. (1 point) What is  $\hat{\beta}_7$ ? The answer is a number from your printout.

$$0.0019947$$

2. (1 point) What is  $R^2 = \frac{SSR}{SST}$ ? The answer is a number from your printout.

$$R^2 = 0.3214$$

3. (2 points) The output from the summary statement ends with an  $F$ -test. What is the null hypothesis for this test? Your answer is a symbolic statement including one or more Greek letters.

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$$

4. (4 points) Allowing for other variables, census regions with higher rates of graduation from High School tend to have \_\_\_\_ crime rates.

- (a) Fill in the blank with the word "higher" or the word "lower."

Higher

- (b) Give the one number from the printout that is the basis of your answer.

$$\hat{\beta}_6 = 0.4475895$$

5. (2 points) In the homework, you were asked to predict the crime rate for a new census tract with an area of 2,500 square miles, 50 percent urban, 10 percent senior citizens, 2,000 doctors, 6,000 hospital beds, 50 percent finished high school, a labour force of 450 thousand, and a total income of 6,500 million dollars. Based on the 95% prediction interval, the crime rate would be between \_\_\_\_ and \_\_\_\_\_. Give two numbers.

$$31.75, 80.55$$

Both  
must be  
correct  
for any  
marks

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Please attach your printout to the quiz paper. Make sure your name is written on the printout.

## Quiz 7 R Printout

```
> census =  
read.table("http://www.utstat.toronto.edu/~brunner/302f13/code_n_data/hw/Ce  
nsusTract.data")  
> attach(census)  
  
> # Q2  
> crimerate = crimes/pop  
> mod = lm(crimerate ~ area + urban + old + docs + beds + hs + labor +  
income)  
> summary(mod)
```

Call:

```
lm(formula = crimerate ~ area + urban + old + docs + beds + hs +  
labor + income)
```

Residuals:

Min	1Q	Median	3Q	Max
-28.1128	-8.3957	-0.4209	7.1998	31.1864

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	21.0000936	10.2108838	2.057	0.041691 *
area	0.0014182	0.0003977	3.566	0.000506 ***
urban	0.1489428	0.0638183	2.334	0.021114 *
old	0.0858062	0.4465427	0.192	0.847915
docs	0.0042640	0.0019497	2.187	0.030502 *
beds	-0.0015261	0.0006059	-2.519	0.012972 *
hs	0.4475895	0.1415152	3.163	0.001939 **
labor	0.0019947	0.0238075	0.084	0.933354
income	0.0001003	0.0016995	0.059	0.953037

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 12.24 on 132 degrees of freedom

Multiple R-squared: 0.3214, Adjusted R-squared: 0.2803

F-statistic: 7.815 on 8 and 132 DF, p-value: 1.472e-08

```
> newregion = data.frame(area=2500, urban=50, old=10, docs=2000, beds=6000,  
hs=50, labor=450, income=6500)  
> predict(mod,newdata=newregion,interval='prediction')  
fit lwr upr  
1 56.15093 31.75172 80.55013
```