STA 302 f2014 Quiz 9 Version A

In homework you fit a model to the Census Tract data, in which crime rate was a function of area, urban, old, docs, beds, hs, labor, income and region of the country. Base your answers on this model.

1. (5 points) We are interested in knowing whether census tracts with greater "urbanization" (percentage of population in cities) tend to have different crime rates once you allow for other characteristics of the census tract.

   (a) Give the null hypothesis in symbols.

   $$H_0 : \beta_2 = 0$$

   (b) Write the value of the test statistic in the space below. The answer is a number from your printout. On your printout, circle the test statistic and write "Question 1b" beside it.

   $$t = 0.511$$

   (c) Write the p-value in the space below. The answer is a number from your printout. On your printout, circle the p-value and write "Question 1c" beside it.

   $$p = 0.61016$$

   (d) Do you reject the null hypothesis at $\alpha = 0.05$? Answer Yes or No.

   No

   (e) Allowing for other variables, census tracts with higher percentage of population in cities tend to have _____ (higher, lower) crime rates. Be guided by the $\alpha = 0.05$ significance level. If the results do not support a conclusion, write "No conclusion."

   No conclusion

Answers to b, c, d, e must be consistent with one another or they are all wrong (-4)

If b & c are wrong, can still get marks for d and e

2. Controlling for all the other variables in the model, is there a difference in crime rate between the South and West regions?

   (a) Give the null hypothesis in symbols.

   $$H_0 : \beta_{10} = \beta_{11}$$

   (b) Write the value of the test statistic in the space below. The answer is a number from your printout. On your printout, circle the test statistic and write "Question 2b" beside it.

   $$F = 1.776$$

   (c) Write the p-value in the space below. The answer is a number from your printout. On your printout, circle the p-value and write "Question 2c" beside it.

   $$p = 0.185$$

   (d) Do you reject the null hypothesis at $\alpha = 0.05$? Answer Yes or No.

   $$No$$

   (e) Allowing for other variables, census tracts in the West tend to have _____ (higher, lower) crime rates than census tracts in the South. Be guided by the $\alpha = 0.05$ significance level. If the results do not support a conclusion, write "No conclusion."

   $$No \quad conclusion$$

Same rule as numero, except that if the
student did not test this null hypothesis,
— 5   (see their printout)

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

STA 302 f2014 Quiz Nine Version B

In homework you fit a model to the Census Tract data, in which crime rate was a function of area, urban, old, docs, beds, hs, labor, income and region of the country. Base your answers on this model.

1. (5 points) We are interested in knowing the average income in a census tract is connected to the crime rate, once you allow for other characteristics of the census tract.

   (a) Give the null hypothesis in symbols.

   $$H_0 : \beta_8 = 0$$

   (b) Write the value of the test statistic in the space below. The answer is a number from your printout. On your printout, circle the test statistic and write "Question 1b" beside it.

   $$t = 0.504$$

   (c) Write the p-value in the space below. The answer is a number from your printout. On your printout, circle the p-value and write "Question 1c" beside it.

   $$p = 0.615$$

   (d) Do you reject the null hypothesis at $\alpha = 0.05$? Answer Yes or No.

   $$No$$

   (e) Allowing for other variables, census tracts with higher income tend to have _____ (higher, lower) crime rates. Be guided by the $\alpha = 0.05$ significance level. If the results do not support a conclusion, write "No conclusion."

   $$No \quad Conclusion$$

   Same rules as Version A

2. Controlling for all the other variables in the model, is there a difference in crime rate between the Northeast and West regions?

  (a) Give the null hypothesis in symbols.

$$H_0 : \beta_{11} = 0$$

  (b) Write the value of the test statistic in the space below. The answer is a number from your printout. On your printout, circle the test statistic and write "Question 2b" beside it.

$$t = 5.107$$

  (c) Write the p-value in the space below. The answer is a number from your printout. On your printout, circle the p-value and write "Question 2c" beside it.

$$p = 1.17e-06$$

$$\text{or} \quad p = 0.00000115 \quad \text{either one}$$

  (d) Do you reject the null hypothesis at $\alpha = 0.05$? Answer Yes or No.

Yes

  (e) Allowing for other variables, census tracts in the Northeast tend to have ___lower___ (higher, lower) crime rates than census tracts in the West. Be guided by the $\alpha = 0.05$ significance level. If the results do not support a conclusion, write "No conclusion."

b, c, d, e must be consistent or they are all wrong. (-4)

One mark each, except that if e is wrong it's -2, with a maximum deduction of 5 for this question.

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

STA 302 f2014 Quiz ~~Nine C~~ 9c   Version 1)

In a study comparing the effectiveness of different weight loss diets, volunteers were randomly assigned to one of two diets (A or B) or put on a waiting list and advised to lose weight on their own. Participants were weighed before and after 6 months of participation in the program (or 6 months of being on the waiting list). The response variable is weight *loss*. The explanatory variables are age (a covariate) and treatment group.

1. (1 point) Write the regression equation. Your model should have an intercept, and regression lines that are not necessarily parallel. Please use x for age. You don't have to say how your dummy variables are defined. You'll do that in the next part.

$$Y_i = \beta_0 + \beta_1 x + \beta_2 d_1 + \beta_3 d_2 + \beta_4 x d_1 + \beta_5 x d_2 + \varepsilon$$

2. (2 points) Make a table with three rows, showing how you would set up indicator dummy variables for treatment group. Give $E(Y|x)$ in the last column.

Need not be simplified

Diet	d_1	d_2	$E(Y/x)$
A	1	0	$\beta_0 + \beta_2 + (\beta_1 + \beta_4)x$
B	0	1	$\beta_0 + \beta_3 + (\beta_1 + \beta_5)x$
Wait	0	0	$\beta_0 + \beta_1 x$

3. (1 point) In terms of β values, what null hypothesis would you test to find out whether the regression lines for diets A and B are parallel?

$$H_0 : \beta_4 = \beta_5$$

4. (2 points) In terms of β values, what null hypothesis would you test to find out whether the effect of diet (including Wait List) depends on the participant's age?

$$H_0 : \beta_4 = \beta_5 = 0$$

5. (2 points) In terms of β values, what null hypothesis would you test to find out whether the Wait list "diet" has any effect at all for 25-year-old participants? Remember, Y is weight *loss*, which could be zero or even negative.

$$H_0 : \beta_0 + 25\beta_1 = 0$$

6. (2 points) In terms of β values, what null hypothesis would you test to find out whether the three diets (including Wait List) differ in their effectiveness for 25-year old participants?

$$H_0 : \beta_2 + 25\beta_4 = \beta_3 + 25\beta_5 = 0$$

Name ___Jerry___

Student Number _____

STA 302 f2014 Quiz 9C Version C

In a study comparing the effectiveness of different weight loss diets, volunteers were randomly assigned to one of two diets (A or B) or put on a waiting list and advised to lose weight on their own. Participants were weighed before and after 6 months of participation in the program (or 6 months of being on the waiting list). The response variable is weight *loss*. The explanatory variables are age (a covariate) and treatment group.

1. (1 point) Write the regression equation. Your model should have an intercept, and regression lines that are not necessarily parallel. Please use x for age. You don't have to say how your dummy variables are defined. You'll do that in the next part.

$$Y_i = \beta_0 + \beta_1 x_i + \beta_2 d_{i,1} + \beta_3 d_{i,2} + \beta_4 x_i d_{i,1} + \beta_5 x_i d_{i,2} + \epsilon_i$$

Okay to give just $E(Y|x,d)$

2. (2 points) Make a table with three rows, showing how you would set up indicator dummy variables for treatment group. Give $E(Y|x)$ in the last column.

Need not be simplified

Diet	d_1	d_2	$E(Y|x)$
A	1	0	$\beta_0 + \beta_2 + (\beta_1 + \beta_4) x_i$
B	0	1	$\beta_0 + \beta_3 + (\beta_1 + \beta_5) x_i$
Wait	0	0	$\beta_0 + \beta_1 x_i$

No need for i

3. (2 points) In terms of β values, what null hypothesis would you test to find out whether the effect of diet (including Wait List) depends on the participant's age?

$$H_0 : \beta_4 = \beta_5 = 0$$

4. (1 point) In terms of β values, what null hypothesis would you test to find out whether the regression lines for diets A and B are parallel?

$$H_0 : \beta_4 = \beta_5$$

5. (2 points) In terms of β values, what null hypothesis would you test to find out whether the three diets (including Wait List) differ in their effectiveness for 25-year old participants?

$$H_0 : \beta_2 + 25\beta_4 = \beta_3 + 25\beta_5 = 0$$

6. (2 points) In terms of β values, what null hypothesis would you test to find out whether the Wait list "diet" has any effect at all for 25-year-old participants? Remember, Y is weight *loss*, which could be zero or even negative.

$$H_0 : \beta_0 + 25\beta_1 = 0$$