STA 442/2101 F 2014 Quiz 10

1. Consider a two-factor analysis of variance with factors A and B, in which each factor has two levels. Use this regression model for the problem:

$$Y_i = \beta_0 + \beta_1 a_i + \beta_2 b_i + \beta_3 a_i b_i + \epsilon_i,$$

where $a_i = 1$ when A = 1 and $a_i = 0$ when A = 2. Similarly, $b_i = 1$ when B = 1 and $b_i = 0$ when B = 2.

(a) (2 points) Fill in the following two-by-two table. Show the expected response for each treatment combination, in terms of β values.

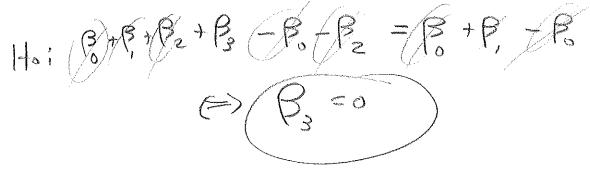
	B=1	B=2
A = 1	Bo+ B,+ B2+ B3	Bo+B,
A=2	Bo + Be	Bo

(b) (2 points) In terms of β values, what null hypothesis would you test to determine whether there is a main effect for Factor B? Circle your answer.

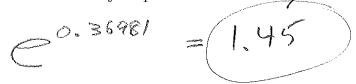
H₀:
$$2\beta_{1} + \beta_{1} + 2\beta_{2} + \beta_{3} = 2\beta_{1} + \beta_{1}$$

$$(2\beta_{2} + \beta_{3} = 0)$$

(c) (2 points) In terms of β values, what null hypothesis would you test to determine whether there is an $A \times B$ interaction? Circle your answer.



- 2. In your analysis of the Awards data, please consider the model with Program, score on the Academic Knowledge Test, and no interactions.
 - (a) (2 Points) Controlling for score on the Academic Knowledge Test, the expected number of awards for a student in the Vocational program is estimated to be _____ times as great as the expected number of awards for a student in the General program. The answer is a number. Write the number on this paper, circle a number on your printout (not the same number), and write "Question 2a beside the number on your printout. Circle your augustion 2



(b) (2 Points) Estimate the expected number of awards for students from the Vocational programme with a score of 50 on the Academic Knowledge Test. The answer is a number. Show a little work and write your answer in the space below. Circle your answer.

$$e^{-6.65071 + 50(0.07015) + 0.36981}$$

$$= e^{-2.7734} = 0.062$$

Please attach your R printout.