Name Jenny

Student Number

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.

	$B = 1$	$B = 2$
$A = 1$	$\beta_0 + \beta_1 + \beta_2 + \beta_3$	$\beta_0 + \beta_1$
$A = 2$	$\beta_0 + \beta_2$	β_0

(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.**

$H_0 : 2\beta_0 + \beta_1 + 2\beta_2 + \beta_3 = 2\beta_0 + \beta_1$

$\Leftrightarrow$ (circled) $2\beta_2 + \beta_3 = 0$

(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.**

$H_0 : \beta_0 + \beta_1 + \beta_2 + \beta_3 - \beta_0 - \beta_2 = \beta_0 + \beta_1 - \beta_0$

$\Leftrightarrow$ (circled) $\beta_3 = 0$

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 answer

$e^{0.36981} = 1.45$

   (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.