STA 442/2101 f2013 Quiz 10

1. (6 points) 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.

   (a) Write the regression equation. Your model should have *no intercept*, and *parallel regression lines*. 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.

   $$Y = \beta_1 d_1 + \beta_2 d_2 + \beta_3 d_3 + \beta_4 x + \varepsilon$$

   $E(Y|x,d)$ is okay

   (b) 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.

	d_1	d_2	d_3	$E(Y|x)$
A	1	0	0	$\beta_1 + \beta_4 x$
B	0	1	0	$\beta_2 + \beta_4 x$
Wait	0	0	1	$\beta_3 + \beta_4 x$

   (c) In terms of β values, what null hypothesis would you test to find out whether, allowing for age, the three diets (including Wait List) differ in their effectiveness?

   $$H_0 : \beta_1 = \beta_2 = \beta_3$$

   (d) In terms of β values, what null hypothesis would you test to find out whether, allowing for age, diets A and B differ in their effectiveness?

   $$H_0 : \beta_1 = \beta_2$$

   (e) In terms of β values, what null hypothesis would you test to find out whether the Wait list "diet" is of any value at all in helping 25-year-old participants to lose weight? Remember, Y is weight loss, which could be zero or even negative.

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

   (f) Is it safe to assume that age is independent of treatment group? Answer Yes or No and briefly explain.

   Yes, because of random assignment

2. These questions are based on your analysis of the Birth Weight Data with SAS.

   (a) (2 Points) You tested whether race differences in average weight of baby depend on the mother's weight.

      i. What is the value of the test statistic? The answer is a number from your printout. Write the number below, and also circle it on your printout. On the printout, write "Question 2(a)i" beside the number.

$$F = 0.30$$

      ii. What is the p-value? The answer is a number from your printout. Write the number below, and also circle it on your printout. On the printout, write "Question 2(a)ii" beside the number.

$$P = 0.744$$

   (b) (2 Points) Base your answers to the questions below on the model with no interactions. Allowing for mother's weight, we want to know if there are any race differences in baby's average weight.

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

$$F = 5.19$$

      ii. What is the p-value? The answer is a number from your printout. Write the number below, and also circle it on your printout. On the printout, write "Question 2(b)ii" beside the number.

$$P = 0.0064$$

I had to cut out the multiple comparisons because I showed the class a bad way as well as a good way to do it.

Please attach your log file and your list file. Make sure your name is written on both files.