This is a preview of what students will see when they are submitting the assignment. Interactive features are disabled.

Quiz 8

Due: Thursday November 12, 2020 6:30 PM (EST)

Submit your assignment

Help

After you have completed the assignment, please save, scan, or take photos of your work and upload your files to the questions below. Crowdmark accepts PDF, JPG, and PNG file formats.

Q1 (5 points)

Body mass index (BMI) is defined as weight in kilograms divided by squared height in metres. It is a measure of how hefty or chunky a person is. ``Normal" weight refers to a BMI between 18.5 and 25. Someone with a BMI over 30 is described as obese.

BMI measurements were obtained for a sample of Grade 8 children and their parents. The child's level of physical activity was also estimated using a cell phone app. In the regression model, x_1 = Mother's BMI, x_2 = Father's BMI, and x_3 = Activity level. The response variable is y = Child's BMI.

a. Write the regression equation in scalar form using $x_{i,j}$ and y_i variables. Assume the order of predictor variables given above.

b. Suppose you have data and have already fitted the model. Give a formula for *estimating* the expected BMI for a child whose mother's BMI = 27, father's BMI = 32, and activity level = 20.

c. Controlling for parents' BMI, is child's activity level related to child's BMI? Give the null hypothesis in scalar form.

d. Controlling for child's activity level, are parents' body mass indices (either or both) related to child's BMI? Give the $\mathbf{C}$ and $\mathbf{t}$ matrices in $H_0 : \mathbf{C}\boldsymbol{\beta} = \mathbf{t}$.

e. Controlling for child's activity level, are parents' body mass indices (either or both) related to child's BMI? Write the *reduced* regression model in scalar form.

Q2 (5 points)

For this question, please start by uploading your complete R input and output for Question 2 of Assignment 8. If the file contains other material in addition to R input and output, that's okay.

Now answer this question based on your output. You really *can* get it from your output. Controlling for computer assignment average and quiz average, what proportion of the *remaining* variation in final exam score is explained by score on the midterm test? Show your work. The final answer is a number. *Circle your answer.*

Quiz 8

(1) (a) $y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \varepsilon_i$

(b) $\hat{y} = \hat{\beta}_0 + 27\hat{\beta}_1 + 32\hat{\beta}_2 + 20\hat{\beta}_3$

(c) $H_0: \beta_3 = 0$

(d) $\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix} \begin{pmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \\ \beta_3 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$

C ↑ +

No + Required

(e) $y_i = \beta_0 + \beta_3 x_{i3} + \varepsilon_i$

(2) $p = \dfrac{g F^*}{g F^* + n - g - 1} = \dfrac{(1)(2.343^2)}{(1)(2.343^2) + 54}$

$= 0.092$