Online Homework System

Assignment Worksheet
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Name: _____ **Class:**
Class #: _____ **Section #:** _____
Instructor: Nathaniel Stevens **Assignment:** Quiz 7

Question 1: (1 point)

Which of the following multi-factor experimentation approaches is most likely to help you find a globally optimal condition?

(a) One-factor-at-a-time experiments

(b) Factorial experiments

Question 2: (1 point)

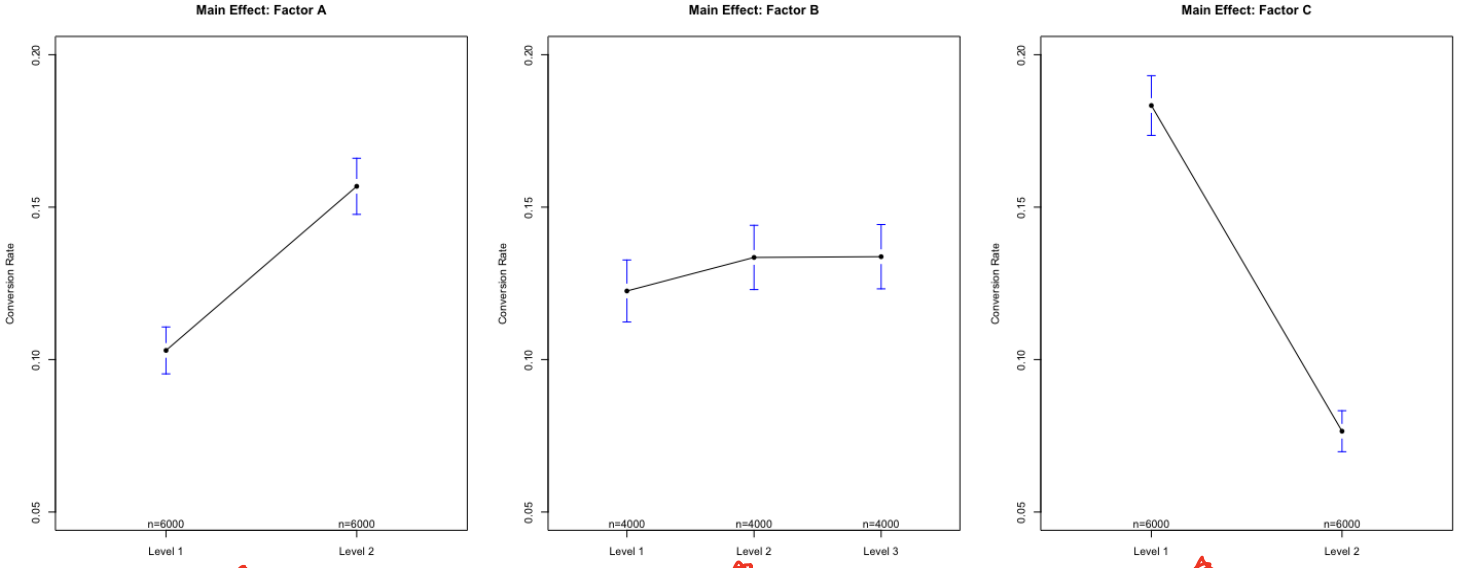
True or False: A one-factor-at-a-time design allows for the estimation of interaction effects.

(a) True

(b) False

Question 3: (3 points)

Suppose that a factorial experiment was used to investigate the influence of the factors A, B, C on a conversion rate metric. The main effects plots for each of these factors is shown below.



Based on these plots, rank the factors in terms of their influence on conversion rate.

_____

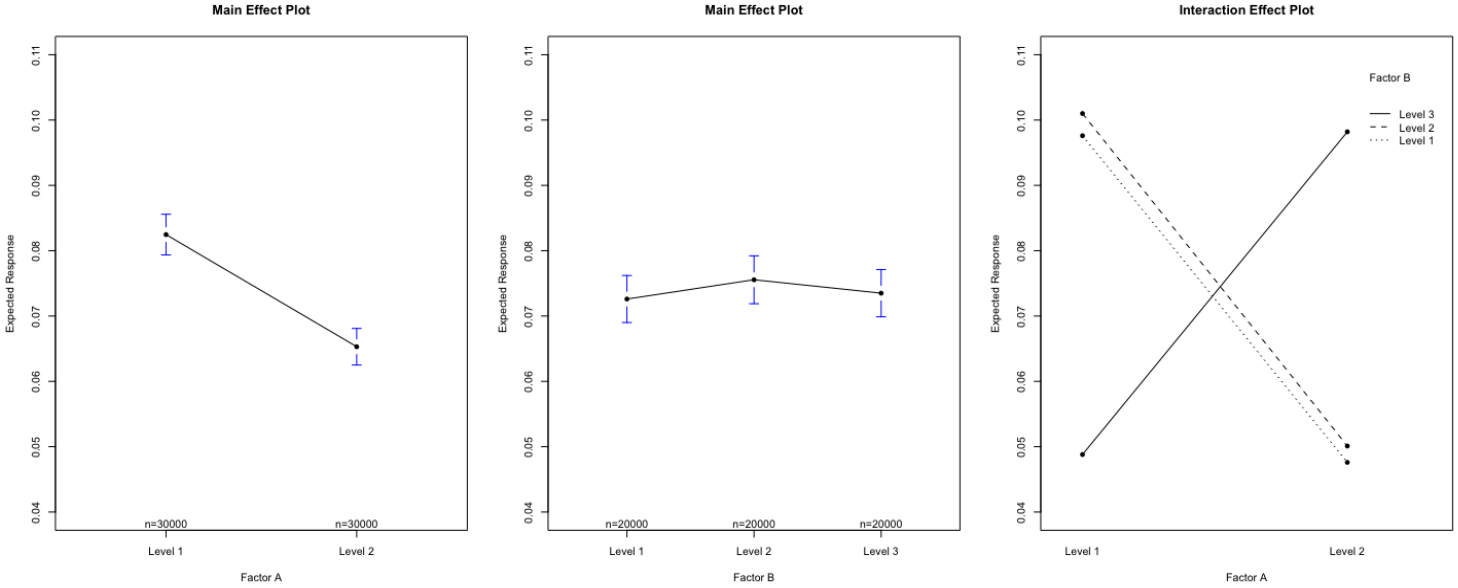
medium influential

least influential

most influential

Question 4: (1 point)

Suppose that a factorial experiment was used to investigate the influence of two factors A and B on a response variable Y. The main effect and interaction effect plots for these factors are shown below.



Based on these plots, what can you conclude about the main effect of Factor A?

(a) Factor A has a positive influence on the response variable

(b) The influence of Factor A depends on the level of Factor B

(c) Factor A has a negative influence on the response variable

Question 5: (5 points)

Suppose that a factorial experiment is used to investigate the influence of three factors A (which has 2 levels), B (which has 3 levels), and C (which has 2 levels) on a response variable Y. A regression model that quantifies the influence of these factors is based on the indicator variables x_1 (which represents Factor A), x_2 and x_3 (which represent Factor B), and x_4 (which represents factor C).

By clicking the appropriate check boxes, indicate which terms would be included in a linear predictor that investigates all relevant main and interaction effects for factors A, B, and C.

(a) x_1

(b) x_2

(c) x_3

(d) x_4

(e) $x_1 x_2$

(f) $x_1 x_3$

(g) $x_1 x_4$

(h) $x_2 x_3$

(i) $x_2 x_4$

(j) $x_3 x_4$

(k) $x_1 x_2 x_3$

(l) $x_1 x_2 x_4$

(m) $x_1 x_3 x_4$

(n) $x_2 x_3 x_4$

(o) $x_1 x_2 x_3 x_4$

Question 6: (1 point)

Suppose that a factorial experiment was used to investigate the influence of two factors A and B on a response variable Y. Suppose also that a regression model is fit to the resulting data with the following linear predictor:

$$\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_1 x_2 + \beta_5 x_1 x_3$$

where x_1 is an indicator variable representing Factor A (which has 2 levels) and x_2 and x_3 are indicator variables representing Factor B (which has 3 levels). Which of the following hypotheses would be used to determine whether the A:B interaction is significant?

(a) $\beta_4 = \beta_5 = 0$

(b) $\beta_1 = \beta_4 = \beta_5 = 0$

(c) $\beta_2 = \beta_4 = 0$

(d) $\beta_3 = \beta_5 = 0$

Question 7: (1 point)

Suppose that a factorial experiment is used to investigate the relationship between a continuous response and three design factors. We can formally evaluate the importance of interaction effects by testing the simultaneous equality of the relevant β's to zero. The specific hypothesis test that would be performed in this scenario is the:

(a) Overall significance *F*-test

(b) Equal variance *F*-test

(c) Distractor *F*-test

(d) Partial *F*-test