Name: _____

PSY 216: Elementary Statistics
Exam 4

This exam consists of 25 multiple-choice questions and 5 essay / problem questions. For each multiple-choice question, circle the one letter that corresponds to the correct answer. Each multiple-choice question is worth 2 points. If you do not show your work in the essay / problem questions, you cannot receive partial credit. Each of the essay / problem questions is worth 10 points. You have until 1:50 PM to finish the exam. Budget your time wisely.

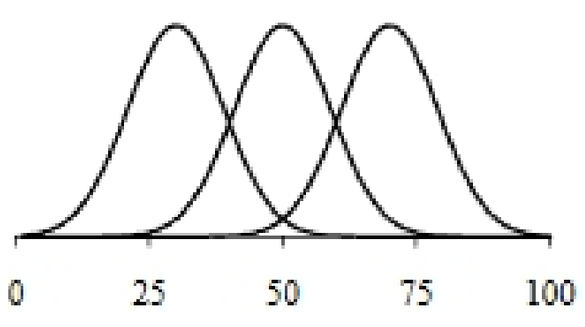
1. What is the difference between $\alpha_{\text{comparison wise}}$ and $\alpha_{\text{family wise}}$?
   A. $\alpha_{\text{comparison wise}}$ is the probability of making a Type-I error in a single comparison while $\alpha_{\text{family wise}}$ is the probability of making at least one Type-I error across all the comparisons performed.
   B. $\alpha_{\text{comparison wise}}$ is the probability of making at least one Type-I error across all the comparisons performed while $\alpha_{\text{family wise}}$ is the probability of making a Type-I error in a single comparison.
   C. $\alpha_{\text{comparison wise}}$ is the probability of making at least one Type-II error across all the comparisons performed while $\alpha_{\text{family wise}}$ is the probability of making a Type-II error in a single comparison.
   D. There is no difference -- they are synonyms.

2. Which of the following are appropriate hypotheses for ANOVA?
   A. $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$
      $H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4$
   B. $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$
      H_1: not H_0
   C. $H_0: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4$
      $H_1: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4$
   D. $H_0: \alpha_1 = \alpha_2 \neq \alpha_3 = \alpha_4$
      $H_1: \alpha_1 \neq \alpha_2 = \alpha_3 \neq \alpha_4$

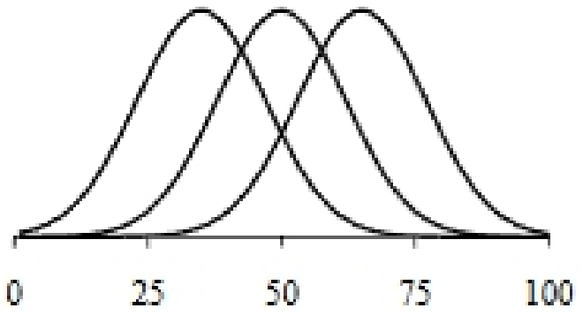
3. Which of the following statements about within-groups variance is / are correct?
   A. Within-groups variance is a measure of error *and* the effect that the independent variable had on the dependent variable.
   B. If you want to reject H_0, you want within-groups variance to be as large as possible.
   C. Within-groups variance is at least partially caused by factors that we did not control in the experiment.
   D. All of the above.

A

B



C



4. Of the three sets of distributions shown above, which has the largest within-groups variance?
   A. A
   B. B
   C. C
   D. The within-groups variances are approximately equal in the three sets of distributions.

5. Which of the following statements about between-groups variance is / are correct?
   A. Between-groups variance at least partially measures the effect of the independent variable on the dependent variable.
   B. Between-groups variance at least partially measures sampling error.
   C. If you want to reject H_0, then you want between-groups variance to be as large as possible.
   D. All of the above

6. Of the three sets of distributions shown above question 4, which has the largest between-groups variance?
   A. A
   B. B
   C. C
   D. There is insufficient information to answer this question.

7. What is the definition of Fisher's F ratio?
   A. F = between-groups variance / within-groups variance.
   B. F = within-groups variance / between-groups variance.
   C. F = error / (effect of the IV on the DV + error)
   D. Both answers B and C

8. What are the expected values of F when H_0 is true and when H_0 is false?
   A. If H_0 is true, the expected value of F is 0. If H_0 is false, the expected value of F is > 0.
   B. If H_0 is true, the expected value of F is > 0. If H_0 is false, the expected value of F is 0.
   C. If H_0 is true, the expected value of F is 1. If H_0 is false, the expected value of F is > 1.
   D. If H_0 is true, the expected value of F is > 1. If H_0 is false, the expected value of F is 1.

9. ANOVA assumes that
   A. the variance of the distributions is homogeneous.
   B. the observations are independent of each other.
   C. the sampling error is normally distributed centered around the mean of the distribution.
   D. All of the above

10. What is the primary difference between the various multiple comparison tests (e.g. between Tukey's Honestly Significant Difference and the Chef Bonferroni test)?
   A. Some of the tests are appropriate only for between-subjects designs while others are appropriate only for within-subjects designs.
   B. Some of the tests are appropriate only for single factor designs while others are appropriate only for two factor designs.
   C. The different tests have different statistical power and different amounts of protection from Type-I errors.
   D. Some of the tests are appropriate only for comparing two means at a time while others are appropriate for comparing three or more means at a time.

11. When should multiple comparisons be performed?
   A. They should be performed if the independent variable has more than 2 levels.
   B. They should be performed if the corresponding main effect is statistically significant.
   C. They should be performed if either answer A or answer B is true.
   D. They should be performed only if both answer A and answer B are true.

12. A factorial design
   A. has all possible combinations of the levels of all the independent variables.
   B. can only tell you about main effects and not interactions.
   C. can only occur for between-subjects designs.
   D. can only occur for within-subjects designs.