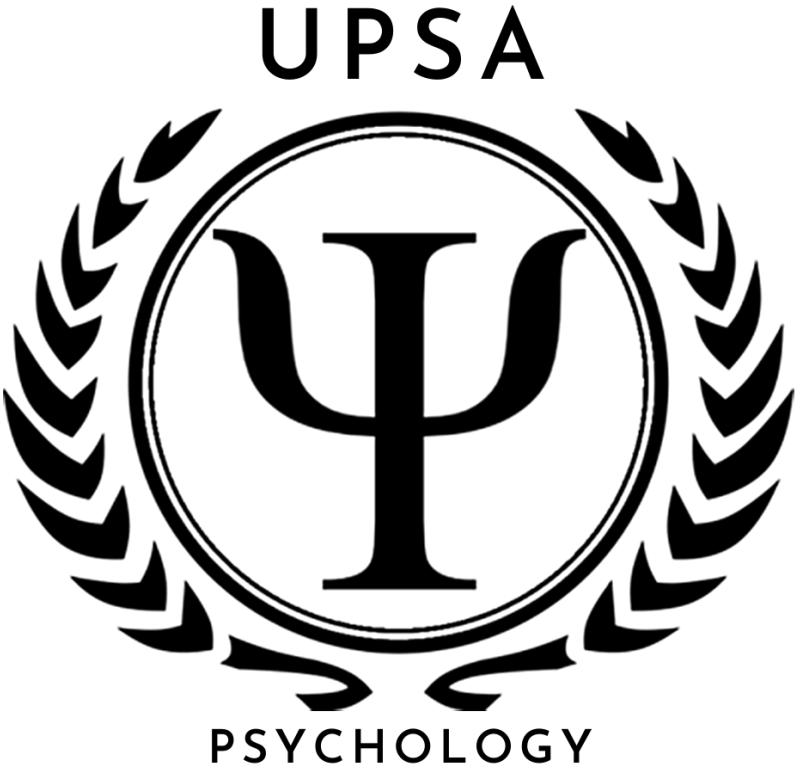
The Undergraduate Psychology Student Association (UPSA)



Mock Exam: PSYC 2021

PSYC 2021 (Prof. Rachel Rabi) Chapters 6 - 9, 15, and 17

Questions

Chapter 6

1. You're drawing 2 balls randomly from an urn which contains 5 red balls and 6 green balls. What is the probability of you drawing 2 balls of different colour?
    a. 6/11.
    b. 5/11.
    c. 5/6.
    d. 2/5.

2. You're drawing 2 balls randomly from an urn which contains 5 red balls and 6 green balls. What is the probability that at least one of the 2 balls is green?
    a. 6/11.
    b. 9/11.
    c. 2/11.
    d. 5/6.

3. A vertical line is drawn through a normal distribution at z = 0. How much of the distribution is located to the right side of the line?
    a. 50.40%.
    b. 50%.
    c. 49.60%.
    d. 0%.

4. For a normal distribution, what is the probability of selecting a score that's lower than 2 standard deviations below the mean?
    a. 97.72%.
    b. 47.72%.
    c. .0228%.
    d. 2.28%.

5. A vertical line is drawn through a normal distribution at z = 1.25. How much of the distribution is located between the line and the mean?
    a. 39.44%.
    b. 89.44%.
    c. 10.56%.

d. 60.56%.

6. What z-score separates the top 20% of the distribution from the rest?
    a. $z = -0.80$.
    b. $z = -0.84$.
    c. $z = 0.84$.
    d. $z = 0.80$.

7. Scores on a high-school English test of Class A were a normal distribution with a mean of $\mu = 65$ and a standard deviation $\sigma = 5.5$. What is the probability of selecting a student with a score greater than 80?
    a. 99.68%.
    b. 32%.
    c. 0.32%.
    d. 0.33%.

8. (Follow-up on the previous question) Students in Class B took the same English test. Class B's scores were also a normal distribution, with a mean of $\mu = 58$ and a standard deviation $\sigma = 7.5$. Who did better between Andre from Class A and Millie from Class B, if they both had a score of 90? Why?
    a. Andre did better because his z-score was higher than Millie's.
    b. Millie did better because her z-score was higher than Andre's.
    c. Their performance was the same because they both had a score of 90.
    d. Andre did better because his z-score was lower than Millie's.

9. For a normal distribution with a mean of $\mu = 120$ and a standard deviation $\sigma = 7$, what is the probability of selecting an individual with a score of between 111 and 128?
    a. 0.4015.
    b. 0.3749.
    c. 0.0266.
    d. 0.7764.

10. An individual is selected from a normal population with $\mu = 150$ and $\sigma = 15$ and a treatment is administered to the individual. After treatment, the individual has a score of $X = 178$. Did the treatment have an effect on this individual and why?
    a. No, the treatment did not have an effect on this individual because their score is within 2 standard deviations away from the mean, and therefore is similar to most individuals in the population.

b. Yes, the treatment had an effect on this individual because their score is nearly 2 standard deviations away from the mean, and therefore is noticeably different from most individuals in the population.
c. Yes, the treatment had an effect on this individual because they obtained a different score from the average score.
d. No, the treatment did not have an effect on this individual because their score was a very unlikely value with a low probability.

Chapter 7

1. The Central Limit Theorem describes the distribution of sample means by identifying its three characteristics. What are the characteristics?
    a. shape, skew, and central tendency.
    b. shape, central tendency, and variability.
    c. mean, median, and mode.
    d. range, variance, and standard deviation.

2. Two samples are obtained from the same population. If the first sample has a sample size of n = 40 and the second sample has a sample size of n = 100, what can you conclude about the sample means of these two samples?
    a. The first sample's mean is more likely to be close to the population mean than the second sample's, because of the law of large numbers.
    b. The first sample's mean is more likely to be close to the population mean than the second sample's, because of the law of standard errors.
    c. The second sample's mean is more likely to be close to the population mean than the first sample's, because of the law of large numbers.
    d. The second sample's mean is more likely to be close to the population mean than the first sample's, because of the law of standard errors.

3. Of the two samples in the previous question, which sample has a smaller standard error?
    a. The second sample has a smaller standard error.
    b. The first sample has a smaller standard error.
    c. They have the same standard error.
    d. Cannot answer without further information.

4. What's the difference between sampling error and standard error?
    a. Sampling errors are the differences between a sample and a population, or between two samples. Standard error measures the average distance between a sample mean and the population mean.
    b. Sampling error helps define and measure the standard error.

c. The standard error helps define and measure sampling error.
d. Both A and C are correct.

5. Calculate the standard error if random samples, each with n = 36 scores are selected from a population with $\mu = 90$ and $\sigma = 12$.
    a. $\sigma_M = 15$.
    b. $\sigma_M = 25.98$.
    c. $\sigma_M = 2$.
    d. $\sigma_M = 4$.

6. Calculate the standard deviation of the population if random samples, each with n = 100 scores are selected from the population with $\mu = 90$, and the average distance between a sample mean and the population mean is expected to be 4.
    a. $\sigma = 40$.
    b. $\sigma = 30$.
    c. $\sigma = 25$.
    d. $\sigma = 22.5$.

7. A sample of n = 49 scores is selected from a normal distribution with a mean of $\mu = 110$ and a standard deviation of $\sigma = 14$. The sample mean is M = 114. What is the z-score for this sample mean?
    a. $z = 2$.
    b. $z = -2$.
    c. $z = 0.28$.
    d. $z = 0.29$.

8. For samples selected from a population with $\mu = 128$ and $\sigma = 16$, what sample size is necessary to make the standard distance between the sample mean and the population mean equal to 1 point?
    a. $n = 16$.
    b. $n = 4$.
    c. $n = 64$.
    d. $n = 256$.

9. If a random sample is selected from a normal population with $\mu = 200$ and $\sigma = 16$ and a treatment is administered to the sample. Which of the following outcomes would be considered noticeably different from a typical sample that did not receive the treatment?
    a. n = 100 with M = 202.
    b. n = 100 with M = 198.
    c. n = 400 with M = 198.

d. n = 400 with M = 202.

10. A psychology professor is organizing group study sessions to help students improve their performance in a Calculus course. At the end of the semester, she plans to measure the effectiveness of these sessions by analyzing the students' final test scores, which are normally distributed with $\mu = 67$ and $\sigma = 9$. She collects a random sample of 100 students for her study. For this sample, between which two values would you expect the average test scores of these students to fall 95% of the time, separating the middle range from the extreme ends?
    a. 65 and 68.
    b. 65.24 and 68.76.
    c. 65.23 and 68.75.
    d. 65.04 and 68.96.

Chapter 8

1. A researcher is testing whether a new therapy reduces anxiety more effectively than a placebo. Although the therapy had no real effect, the researcher concluded that it does, based on the study results. What type of error did the researcher make?
    a. Type I error.
    b. Type II error.
    c. Both Type I and Type II error.
    d. Neither Type I nor Type II error.

2. A researcher is testing a new teaching method to improve student performance on exams. They set the alpha level at .05. What does this alpha level represent?
    a. The probability of making a Type II error.
    b. The probability that the study results will be statistically significant.
    c. The probability of making a Type I error.
    d. The probability that the study will have a high statistical power.

3. A researcher is predicting that a treatment will decrease scores. If this treatment is evaluated using a one-tailed hypothesis test, where would the critical region for the test be?
    a. The critical region would be entirely in the right-hand tail of the distribution.
    b. The critical region would be entirely in the left-hand tail of the distribution.
    c. The critical region would be divided equally between the two tails of the distribution.
    d. Cannot answer without additional information.

4. Which of the following changes would increase the statistical power of a study?
    a. Decreasing the sample size.
    b. Reducing the effect size.
    c. Changing the test from one-tailed to two-tailed.
    d. Increasing the alpha level from .01 to .05.

5. A nutritionist is testing a diet plan to see if it leads to significant weight loss compared to a standard diet. If they make a Type II error, what would their conclusion be?
    a. The diet plan is effective, even though it actually is not.
    b. The diet plan is not effective, even though it actually is.
    c. Both diets are equally effective, regardless of actual differences.
    d. The diet plan is effective, even though it isn't different from the standard plan.

The following scenario will apply to the next 5 questions: A population of graduate students get an average of $\mu = 36$ hours of sleep per week, with $\sigma = 9$. This is a normal distribution. After a sleep treatment was administered to a sample of $n = 81$ students, their average hours of sleep per week was $M = 38.5$. A researcher is interested in whether the sleep treatment had an effect on the students.

6. State the null and alternative hypotheses in this scenario.
    a. $H_0: \mu = 36$, $H_1: \mu \neq 36$.
    b. $H_0: \mu = 38.5$, $H_1: \mu \neq 36$.
    c. $H_0: \mu = 38.5$, $H_1: \mu \neq 38.5$.
    d. $H_0: \mu = 36$, $H_1: \mu \neq 38.5$.

7. Calculate the z-score for this scenario. With $\alpha = .05$, does the z-score value suggest that the sleep treatment had an effect on the students? Why or why not?
    a. $z = 0.28$. With $\alpha = .05$, the z-score is not in the critical region, meaning that it is likely that the null hypothesis is true. We do not reject the null hypothesis and conclude that the sleep treatment did not have an effect on the students.
    b. $z = 2.5$. With $\alpha = .05$, the z-score is in the critical region, meaning that it is unlikely that the null hypothesis is true. We reject the null hypothesis and conclude that the sleep treatment had an effect on the students.
    c. $z = 0.28$. With $\alpha = .05$, the z-score is in the critical region, meaning that it is unlikely that the null hypothesis is true. We reject the null hypothesis and conclude that the sleep treatment had an effect on the students.
    d. $z = 2.5$. With $\alpha = .05$, the z-score is not in the critical region, meaning that it is likely that the null hypothesis is true. We do not reject the null hypothesis and conclude that the sleep treatment did not have an effect on the students.

8. You calculated and got a p-value of .012. With $\alpha = .01$, what decision would you make about the null hypothesis?
    a. Because $p < \alpha$, we reject the null hypothesis and conclude that the treatment had an effect.
    b. Because $p > \alpha$, we reject the null hypothesis and conclude that the treatment had an effect.
    c. Because $p < \alpha$, we do not reject the null hypothesis and conclude that the treatment did not have an effect.
    d. Because $p > \alpha$, we do not reject the null hypothesis and conclude that the treatment did not have an effect.

9. Calculate the effect size (Cohen's d) for the treatment effect. Is it a small, medium, or large effect?
    a. Cohen's d = 0.28. This is a small effect.
    b. Cohen's d = 0.28. This is a medium effect.
    c. Cohen's d = 0.57. This is a medium effect.
    d. Cohen's d = 0.57. This is a large effect.

10. A different researcher is interested in whether the sample of students who received the treatment slept more than the general population of graduate students. State the null and alternative hypotheses.
    a. $H_0: \mu \geq 38.5$, $H_1: \mu < 38.5$.
    b. $H_0: \mu \leq 38.5$, $H_1: \mu > 38.5$.
    c. $H_0: \mu \leq 36$, $H_1: \mu > 36$.
    d. $H_0: \mu \geq 36$, $H_1: \mu < 36$.

Chapter 9

1. A researcher wants to determine whether a new educational program affects students' math test scores. She knows the population mean math score is 70 and the population standard deviation is 10. She collects a large sample of 100 students who completed the new program and calculates the mean score for this sample. Which test should she use to analyze the data?
    a. z-test.
    b. t-test.
    c. Chi-square test.
    d. ANOVA.

2. If a t statistic is computed for a sample of n = 16 scores with SS = 285, what are the sample variance and the estimated standard error for the sample mean?

a. $s^2 = 17.8$, $s_M = 1.09$.
b. $s^2 = 17.8$, $s_M = 1.05$.
c. $s^2 = 19$, $s_M = 1.09$.
d. $s^2 = 19$, $s_M = 1.05$.

3. Which of these is NOT an assumption of the t-test?
    a. The values in the sample must consist of independent observations.
    b. The population sampled must be normally distributed.
    c. The sample size must contain at least 30 observations.
    d. Both A and C are correct.

4. The results of a hypothesis test are reported as follows: "$t(16) = 4.63$, $p < .001$". Based on this report, how many individuals were in the sample?
    a. 16.
    b. 17.
    c. 18.
    d. 19.

5. A psychology student wants to test whether the average stress level of college students at his university differs from the national stress level of 6.5 (out of 10). He collects a sample of 25 students from his university and calculates the mean and standard deviation of their stress levels. The population standard deviation is unknown. Which test should he use to analyze the data?
    a. z-test.
    b. t-test.
    c. Chi-square test.
    d. ANOVA.

The following scenario will apply to the next 5 questions: A psychologist believes that the average age of adolescents seeking counseling for social anxiety is older than 16. To test this, she surveys the next 25 adolescents who come in for counseling and records their ages. She calculates a mean age of 17.10 years with a standard deviation of 2.25 years. Use this sample data to test the psychologist's claim.

6. State the null and alternative hypotheses.
    a. $H_0: \mu = 16$, $H_1: \mu \neq 16$.
    b. $H_0: \mu < 16$, $H_1: \mu \geq 16$.
    c. $H_0: \mu \leq 16$, $H_1: \mu > 16$.
    d. $H_0: \mu \geq 16$, $H_1: \mu < 16$.

7. Calculate the degrees of freedom (df).
    a. df = 25.
    b. df = 26.
    c. df = 23.
    d. df = 24.

8. Calculate the estimated effect size (Cohen's d). Is it a small, medium, or large effect?
    a. Cohen's d = 0.49. This is a medium effect.
    b. Cohen's d = 0.49. This is a very small effect.
    c. Cohen's d = 1.1. This is a very large effect.
    d. Cohen's d = 1.1. This is a medium effect.

9. Calculate the estimated standard error for the sample mean and the t-statistic.
    a. $s_M = 0.45$, t = 2.44.
    b. $s_M = 0.45$, t = 10.23.
    c. $s_M = 0.22$, t = 10.23.
    d. $s_M = 0.22$, t = 2.44.

10. If the p-value associated with the t-statistic is .011, what would you conclude given that $\alpha = .05$?
    a. Because $p > \alpha$, we do not reject the null hypothesis and conclude that the average age of adolescents seeking counselling is equal to or less than 16.
    b. Because $p < \alpha$, we reject the null hypothesis and conclude that the average age of adolescents seeking counselling is equal to or less than 16.
    c. Because $p < \alpha$, we do not reject the null hypothesis and conclude that the average age of adolescents seeking counselling is equal to or less than 16.
    d. Because $p < \alpha$, we reject the null hypothesis and conclude that the average age of adolescents seeking counselling is older than 16.

Chapter 15

1. Which of the following graphs/plots are typically used to visualize correlations?
    a. Histogram.
    b. Bar graph.
    c. Scatter plot.
    d. Box plot.

2. Which of the following characteristics about the relationship does a Pearson's correlation NOT tell you?
    a. The strength of the relationship.

b. The linearity of the relationship.
c. The direction of the relationship.
d. The significance of the relationship.

3. Pearson's r is to ___ as M is to μ (mu).
    a. σ (sigma)
    b. ρ (rho)
    c. s
    d. X

4. Which of the following interpretations can correctly be drawn from a Pearson's correlation of r = 0.76
    a. The relationship between the two variables is weak.
    b. The relationship between the two variables is positive.
    c. The relationship between the two variables is non-linear.
    d. The relationship between the two variables is significant.

5. Which of the following is NOT an assumption for Pearson's correlation.
    a. The relationship is significant.
    b. The relationship is linear.
    c. The variables are normally distributed.
    d. The variables are on an interval or ratio scale.

6. What would Pearson's correlation be if the sum of products = 15, the sum of squares for X = 12, and the sum of squares for Y = 22?
    a. r = 0.85.
    b. r = 0.06.
    c. r = 0.24.
    d. r = 0.92.

7. The conceptual formula for Pearson's correlation is the ratio between which of the following?
    a. Variability (numerator) and covariability (denominator).
    b. Covariability (numerator) and variability (denominator).
    c. Sum of squares of X (numerator) and sum of squares of Y (denominator).
    d. Sum of squares of Y (numerator) and sum of squares of X (denominator).

8. How can we interpret a negative covariance between X and Y?
    a. The values of X and Y tend to be low at the same time.
    b. The values of X and Y tend to be high and low at the same time.

c. The value of X tends to increase as the value of Y decreases.
d. The values of X and Y do not vary together.

9. How would a Pearson's correlation typically be affected if the sample size increases?
    a. The correlation coefficient would likely increase in size.
    b. The correlation coefficient would likely decrease in size.
    c. The correlation coefficient would change in directionality.
    d. The correlation coefficient would not change.

10. A researcher conducts an observational study and computes a Pearson's correlation of r = 0.8 between two variables (X and Y). Which of the following statements is correct?
    a. Variable X causes Y because X is the independent variable and Y is the dependent variable.
    b. When variable X increases by 1, it causes Y to increase by 0.8.
    c. The association between variables X and Y is positive and strong because 0.8 is a strong magnitude.
    d. The association between variables X and Y is positive but weak because 0.8 is a small number.

Chapter 17

1. What type of test are all chi-square tests?
    a. Parametric.
    b. Non-parametric.
    c. Goodness-of-fit.
    d. Independence.

2. Which one of the following is NOT a requirement for chi-square tests?
    a. Nominal variables.
    b. Independent observations.
    c. Nominal variables with at least two levels.
    d. Assumption of normality in the sample distribution.

3. Is a negative chi-square value possible? Why?
    a. Yes, because it indicates there is a negative relationship between variables.
    b. Yes, because it can be interpreted as a standardized effect size.
    c. No, because there can only be a positive relationship between levels.
    d. No, because the numerator in the formula is squared.

4. A chi-square goodness-of-fit test determines which of the following?
    a. The relationship between two nominal variables with any number of levels.
    b. The relationship between two nominal variables with at least two levels.
    c. How well the observed frequency of the sample fits the expected frequency of the sample.
    d. How well the observed frequency of the sample fits the expected frequency in the population.

5. Which of the following hypotheses can be tested using a chi-square goodness-of-fit test?
    a. Proportions between levels of a nominal variable in the sample are unevenly distributed.
    b. Proportions between the levels of a nominal variable in the sample are not different from a known population.
    c. Both of these hypotheses can be tested.
    d. Only hypothesis A can be tested.
    e. Only hypothesis B can be tested.

6. A chi-square test for independence determines which of the following?
    a. The relationship between two nominal variables with any number of levels.
    b. The relationship between two nominal variables with at least two levels.
    c. How well the observed frequency of the sample fits the expected frequency of the sample.
    d. How well the observed frequency of the sample fits the expected frequency in the population.

7. Which of the following hypotheses can a chi-square test for independence test?
    a. In the population, there is no relationship between the two variables.
    b. In the population, the distributions are the same for the two variables.
    c. Both of these hypotheses can be tested.
    d. Only hypothesis A can be tested.

8. What is the shape of a chi-square distribution?
    a. Normal.
    b. Positively skewed.
    c. Negatively skewed.
    d. Bimodal.

9. Which of the following is used to calculate the degrees of freedom for a chi-square test?
    a. Sample size.
    b. Number of levels.

c. Both sample size and number of levels.
d. Neither sample size nor number of levels.

10. A researcher at a university wants to know if the differences between the ratio of male to female professors is different in the psychology department compared to the math department which has a 80/20 male to female ratio. Which of the following tests should be conducted?
    a. A t-test.
    b. A chi-square goodness-of-fit test.
    c. A chi-square test of independence.
    d. Both a chi-square goodness-of-fit and test of independence.

Answer Key

Chapter 6

1. A
2. B
3. B
4. D
5. A
6. C
7. C
8. A
9. D
10. B

Chapter 7

1. B
2. C
3. A
4. D
5. C
6. A
7. A
8. D
9. D
10. B

Chapter 8

1. A
2. C
3. B
4. D
5. B
6. A
7. B

8. D
9. A
10. C

Chapter 9

1. A
2. C
3. C
4. B
5. B
6. C
7. D
8. A
9. A
10. D

Chapter 15

1. C
2. D
3. B
4. B
5. A
6. D
7. B
8. C
9. A
10. C

Chapter 17

1. B
2. D
3. D
4. D
5. C
6. B

7. C
8. B
9. B
10. B