

## Psyc 381 F17 Exam 1 Review

### General Exam Information

#### Format:

- The material on the exam will focus most heavily on your comprehension of the major concepts covered in the exam-specific chapters. As such, it is best to prepare for this exam by focusing on conceptual topics instead of preparing as though it is a math exam (e.g. focusing solely on the use of equations).
- The exam will consist of a variety of assessment methods, including multiple choice items, short answer / fill-in-the-blank items, interpretation of tables, graphs, and/or SPSS output, calculations from raw or summary data, and short essay questions.
- For the exam items that require hand-calculations, be prepared to show your full work. Incorrect answers may result in partial credit depending on the nature of the error.
- For the short-essay questions: Word choice matters! Given the overlap of similar-sounding terms, you should take care to ensure that your wording is accurate and concise; a shorter answer may be lacking necessary information to answer the entire question, but longer answers are not always better if terms / concepts are being used incorrectly.
- Be able to interpret and discuss any SPSS-related work that has been reviewed as part of class discussions leading up to the exam. Use the SPSS assignments as a guide as to the information you are expected to know as anything SPSS-related covered in class or on the assignments is fair-game for the exam.
- The entire class period will be available for completing the exam. Students will not be given extra time to complete the exam if they arrive late – all exams are expected to be completed by the time the class period ends.

#### Exam Materials:

- Exams are completely closed-book. Any additional materials will be provided as necessary. Formula sheets may be provided to students for use on the exam; however, it is best to prepare as though you will not have access to such a resource as this will typically not be the case. Refer to the following pages for the formulas you should expect to encounter on the exam.
- A calculator will be necessary to complete some of the exam items. To avoid the possibility of academic dishonesty, only standalone calculators are permitted – The use of a smartphone, laptop, tablet, or any other device that has the potential to access the internet is not acceptable.

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**Exam-Specific Content**

**Major Themes:**

The role of statistics in psychological research	Describing a set of values as a whole distribution	Describing a distribution through measures of central tendency	Describing a distribution through measures of variability
Process and purpose of standardization	Process and purpose of developing sampling distributions	Role of central limit theorem in understanding sampling distributions	Use of sampling distributions to make predictions of future outcomes

**Key Terms & Concepts:**

Descriptive statistics vs. Inferential statistics	Populations vs. Samples	Random vs. non-random (convenience) samples	Parameters vs. statistics (notation and concepts)
Identifying variables and associated variable values	Qualitative vs. Quantitative variables	Levels of variable measurement (NOIR)	Discrete vs. continuous variables (and real limits)
Identification and usage of statistical notation	Types of Frequency Counts / Distributions	Characteristics and uses of bar graphs / histograms	Characteristics of a distribution shape (modality, skewness)
Characteristics of normal distributions	Measures of Central tendency: Mean, median, mode	Impact of outliers on measures of central tendency	Meaning and use of deviation scores
Measures of variability: sum of squares, variance, standard deviation	Variance estimates biased vs. unbiased estimators (N vs. N – 1) (degrees of freedom)	Impact of outliers on measures of variability	Use of the mean and standard deviation as a statistical model
Purpose and process of creating z scores from a distribution of raw values	Use of the standard normal distribution	Difference between individual vs. sample outcomes	Point estimation & Sampling error
Purpose and process of developing a sampling distribution of the mean	Practical application of the central limit theorem	Determining the expected mean of a sampling distribution of the mean	Determining the expected variation of a sampling distribution of the mean

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**Notation & Calculations:** Be ready to calculate and/or apply any of the concepts stated below if provided with if provided with sufficient information (e.g., raw data, summary statistics, research context). Additionally, be able to identify the covered statistical concepts by their notation alone (or vice versa) and know how to read recently reviewed SPSS output files (e.g., evaluating a set of findings based on provided information generated through the use of SPSS).

Be able to calculate outcomes based on statistical notation	Be able to determine from raw data (or a table) various frequency counts	Be able to construct and evaluate a bar graph / histogram	Be able to determine the mean, median, and mode of a distribution
Be able to calculate a set of deviation scores from a set of raw values	Be able to determine the sum of squares of a distribution	Be able to determine the variance of a distribution	Be able to determine the standard deviation of a distribution
Be prepared to work with variance and standard deviation estimates (N vs. N - 1)	Be able to create a set of z scores from a set of raw values	Be able to answer general questions about the distribution of outcomes in standard normal dist.	Be able to determine the mean of a sampling distribution of the mean
Be able to determine the std. error of a sampling distribution of the mean	Be able to answer general questions about the distribution of sample outcomes in a samp. dist.		

**Example Short Essay Questions:** Below are a set of questions I have either used in the past or have used as part of reviews sessions with former students. Be prepared to provide thorough answers to these questions (or ones with similar topics) and to those that have been asked during in-class discussions.

- Imagine you handed out a survey to 120 students that asked them to indicate their class standing (freshman, sophomore, junior, senior, graduate student). Explain how you would create an absolute frequency distribution and a relative frequency distribution based on the responses in the completed surveys.
- Why is it useful to create relative frequencies (or percentages) to describe outcomes rather than just (absolute) frequencies?
- When describing a distribution of scores (e.g., measures of height or weight), what does it mean when a score is referred to as an “outlier”? How does the presence of outliers affect the accuracy of the mean and median for describing that distribution? Are they affected similarly? Why or why not?
- When describing a distribution of scores, what information is provided by its “mean” and its associated “standard deviation”?
- Identify and explain a real-life situation in which the mode would be the most suitable measure of central tendency (vs. the mean or the median) for describing a typical response in a distribution.
- Why is it necessary to create the sum of squares rather than relying on the average deviation score to start describing the extent to which values (or scores) in a distribution vary from the mean?
- For the purpose of describing variability of a distribution, why is it necessary to calculate the variance rather than relying on the sum of squares?

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- Compare the process for calculating the variance from a population distribution ( $\sigma^2$ ) to the variance estimate from a sample distribution ( $S^2$ ) – what is the major difference between the two calculations and what purpose does this difference serve?
- What is the reason for transforming the variance into the standard deviation when describing variability of scores within a distribution (e.g., a distribution of height or weight measurements)?
- Imagine you have a set of 200 students complete a self-esteem questionnaire. Student A obtains a z-score of 2.13 and student B obtains a z-score of -0.44. Statistically speaking, what do the specific z-values for these students (2.13, -0.44) represent? Compared to the rest of the sample, what general interpretations can be made for these two students' self-esteem based on their z-scores?
- What is the purpose behind turning raw data into z-scores? Based on the *assumption of normality*, how does this process allow for psychologists to describe the likelihood of some outcomes to occur compared to others?
- What is a sampling distribution of means? What three characteristics of sampling distributions are described by the central limit theorem?
- Given a population distribution of exam scores ( $\mu_x = 75$ ,  $\sigma_x = 12$ ) that are normally distributed, should an instructor expect more variability in the distribution of individual exam scores or in a distribution of sample means ( $N = 30$ ) taken from this population. Provide an explanation for your answer.