**Stats I & II:**

**KSC: Understand basic, essential statistics terminology.**

1. Suppose the Office of Career Services at UAPB wishes to study the career goals of the 21 year old women currently enrolled in the university. Using random selection, they gather the career goal data from 150 of the 21 year old women. Their definition of “all 21 year old women enrolled at UAPB” constitutes the ____________, and the subset of 150 women constitutes their ____________.

2. The director of student recruitment is interested in the ACT scores for the incoming Freshmen class. A group of 300 students is surveyed and the research finds that these students have an average ACT score of 21. For this study, the average of 21 is an example of a(n) ___________.

3. An experiment is conducted to determine whether or not Advil helps reduce symptoms of headache pain. One group of headache sufferers are given a dose of Advil, and another group of headache sufferers are given a dose of vitamin C. After one hour, the researcher measures their level of pain. The type of medicine they received is the ____________ variable, and their level of pain is the ____________ variable.

4. Clayton’s creamery sells ice cream by the ounce. However, Cold Stone Creamery sells its ice cream in three sizes: Like It, Love It, and Gotta Have It. Clayton’s Creamery uses the ____________ scale of measurement, and Cold Stone uses the ____________ scale of measurement.

**KSC: Summarize and describe distributions of scores with measures of central tendency and variability.**

1. Chow Town pet food company conducts a study with the end goal of increasing sales. They survey how many pets families have on average, which type of house pet is most common, and how much money the typical household spends on pet food in a year. Identify which measure of central tendency (mean, median, mode) would be most appropriate for each.

2. For the following scores, calculate the mean, median, mode, and range.
   - 2, 25, 22, 24, 22, 23

3. The Office of Student Life gathers data on the age of the enrolled students at UAPB. They find that most of their students are fairly young, in their early 20’s. While the youngest student is 17 and the oldest is 62, there are relatively few students who are older than 35. This shape of this distribution would be ____________ skewed.

4. Think of weighing yourself on the bathroom scale that only marks off whole pounds. You look down at the needle, which is in between 123 and 124 pounds, but is closer
to the 124 mark. Being brutally honest with yourself, you’d say you weigh 124 pounds since it falls within the real limits of 124. What are the upper and lower real limits of this interval for 124 pounds, if the scale only marks off whole pounds?

**KSC: Understand how to use z-scores to describe locations within a distribution and to standardize entire distributions.**

1. Albert takes an IQ test and the results suggest that he has a z score of +2.50. What does this suggest about his level of intelligence?

2. Compute the z scores for the raw score of 57.5, with M = 50 and s = 5.

3. As a sample size decreases, the standard error of the mean increases. Explain why this is.

4. A population has a mean \( \mu = 50 \) and a standard deviation \( \sigma = 12 \). If we have a sample size of \( n = 4 \), what is the standard error for the distribution of sample means (what is the \( \sigma_M \)?)

**KSC: Demonstrate ability to conduct and interpret hypothesis tests.**

1. Dr. Jones is conducting a study to evaluate the effectiveness for the cold remedy medicine, Zicam. It is purported to reduce the duration and severity of cold symptoms. A sample of 16 sick patients is recruited to try out the medicine. What should Dr. Jones null hypothesis be? Should he use a one tailed test, or two?

2. Dr. Jones obtains the following data, relating to his Zicam study: \( \mu = 50; \sigma = 12; n = 16; M = 45 \), and he calculates a z-score of 2.66. If he uses an alpha of \( \alpha = .01 \), will he reject or fail to reject his null hypothesis? Why or why not?

3. A patient goes to his doctor to get tested for pancreatic cancer. It will be a few days before he receives the results, and the patient worries about the results he will receive. Provide a statement that might explain Type I error and Type II error in this circumstance.

4. Kaplan Test Prep does a test to evaluate whether or not their GRE prep course will improve a person’s GRE score. They are using an alpha of \( \alpha = .001 \), with \( \mu = 300; \sigma = 15; n = 16; M = 310 \). They calculate their results, and must fail to reject their null \( (z = 2.66, and critical value is 3.09) \). Next, they extend their study and now include \( n = 256 \) participants. Calculate the new z-score, determine what to do with the null, and explain why the results changed when the only difference was an increase in the sample size.
KSC: Understand and interpret t-tests and analyses of variance that answer different research questions.

1. Psychologists are interested to know whether or not Thorazine affects thought disorder symptoms among patients diagnosed with schizophrenia. The null hypothesis is that Thorazine has no effect, and the alternate hypothesis is that there is a difference—that Thorazine does have an effect. The research team has gathered data from two different samples. The first group of participants has not taken the drug, and the second group of participants has been taking Thorazine. In this setup, is this a one-tailed or two-tailed test (and explain why)? Is this an independent samples t-test, repeated measures t-test, or factorial analysis of variance (and explain why)?

2. Swearing is a common response to pain. Researchers conducted an experiment comparing swearing with other responses to pain. They hypothesize that swearing increases the amount of pain a person can tolerate. For this study, a group of participants were to place one hand in icy water for as long as they could bear the pain. In the first trial, they were told to repeat their favorite swear word over and over for as long as their hands were in the water. Then, in their second trial, the same participants were told to repeat a neutral word over and over as long as their hands were in the water. In both trials, researchers measured how long they were able to tolerate the pain while their hands were submerged. In this setup, is this a one-tailed or two-tailed test (and explain why)? Is this an independent samples t-test, repeated measures t-test, or factorial analysis of variance (and explain why)?

3. Dr. Cole studies social anxiety, and wishes to compare the effectiveness of different treatments. The research team has gathered data from three different samples. The first group of participants has had no treatment (the control group). The second group of participants has been taking the anxiety medication, Escitalopram. And the third group of participants has been participating in cognitive behavioral therapy. Is this an independent samples t-test, repeated measures t-test, or factorial analysis of variance (and explain why)?

KSC: Understand and interpret correlations and chi-square tests to answer research questions.

1. Is the number of pets a person has linked to a person’s mood? Dr. Gladd believes so, and hypothesizes that people with more pets will have a higher score on a measure of affect, indicating a happier mood. He’s not able to randomly assign people to have pets or not, and does not wish to control or manipulate variables. As such, he gathers data from 250 people, and they indicated the number of pets they own, and also completed a survey on their mood. Which type of test should he use to analyze his data (correlation, chi-square, regression) and why?

2. Dr. Gladd completes his statistical analysis and obtains a coefficient of $r = +0.76$. Identify the direction and strength of the relationship, and explain how this data relates back to the variables of number of pets and mood in a sentence.
3. After taking their midterm exam, a course professor asks students whether or not they studied for the test. He records their responses, “yes” or “no”, which uses a nominal scale of measurement. Which type of test should he use to analyze his data (correlation, chi-square, regression) and why?

4. UAPB’s mass communication and broadcasting students are conducting a chi-square analysis to determine enrolled students’ radio station preference. They hypothesize that there will not be an equal preference across the four top radio stations, Station A, Station B, Station C, and Station D. What should their null hypothesis be?

**Experimental Psychology**

**KSC: Critically evaluate the quality of existing research.**

1. Define simple random sampling and explain its strengths and weaknesses.

2. Describe four probability sampling methods other than simple random sampling (stratified random, proportionate stratified random, systematic, and cluster), and explain the strengths and weaknesses of each.

3. For each of the following scenarios, identify which sampling method is used:
   a. The State College is conducting a survey of student attitudes and opinions. The plan is to use the list of all registered students and randomly select 50 freshmen, 50 sophomores, 50 juniors, and 50 seniors to make up the sample.
   b. A second option for the college survey (in part a) is based on the observation that the college accepts a large number of transfer students each year. As a result, the junior and senior classes are twice as large as the freshman and sophomore classes. To ensure that the sample reflects this difference in class size, the alternative plan is to determine the number of students in each class, then select a sample so that the number for each class in the sample is in direct relation to the number in each class for the entire college.
   c. The County Democratic Committee would like to determine which issues are most important to registered Democrats in the county. Using the list of registered Democrats, the committee selects a random sample of 30 for telephone interviews.
   d. A faculty member in the Psychology Department posts notices in classrooms and buildings on campus, asking for volunteers to participate in a human memory experiment. Interested students are asked to leave their names and telephone numbers.
   e. An educational psychologist selects a sample of 40 third-grade children from the local public school, ensuring that the sample is divided evenly with 20 boys and 20 girls.

4. Define the concepts of internal and external validity. Give examples of threats to both.

5. Describe the third-variable problem and the directionality problem and explain why they must be eliminated before an experiment can demonstrate a cause-and-effect relationship.
6. Define individual differences and explain how assignment bias and confounding from environmental variables can threaten the internal validity of a between subjects design.

7. Identify the three primary techniques for limiting confounding by individual differences in between-subjects experiments (random assignment, matched assignment, and holding variables constant) and explain how each one works.

8. Describe how the following time-related factors can threaten the internal validity of some within-subjects experiments: history, maturation, instrumentation, statistical regression, and order effects.

KSC: Apply current ethical theory to psychological research.
1. For each of the following, identify which of the three basic principles of the Belmont Report is being violated and how they are being violated:
   a. A researcher recruits poor minorities to be participants in a risky experiment.
   b. A researcher tricks people into participating by suggesting that they might win a contest.
   c. A researcher knows that people will feel ashamed after one part of the study.

2. Explain the difference between passive and active deception.

3. Describe the two basic categories of ethical responsibility that a researcher has.

4. What are acceptable methods of maintaining confidentiality?

5. Why is obtaining informed consent important?

KSC: Identify different types of research design and their strengths and weaknesses.
1. Describe the general purpose of an experimental research study and differentiate experiments from other types of research.

2. Describe the defining characteristics that differentiate a between-subjects design and a within-subjects design. Explain the general advantages and disadvantages of between-subjects design compared to within-subjects design.
3. Determine whether a within-subjects or between-subjects design would be preferred for the following general scenarios:
   a. large individual differences and a small number of available subjects
   b. treatments expected to have long-lasting or permanent effects
   c. small individual differences with a large number of available subjects
   d. relatively large individual differences and relatively small treatment effect

4. Describe the two nonexperimental nonequivalent group designs (differential research and the posttest-only nonequivalent control group design) and the quasi-experimental nonequivalent group design (pretest–posttest nonequivalent control group design), and give examples of studies using each of these designs.

5. Describe three specific applications of the factorial design: (1) adding a factor to an existing study; (2) using a participant variable as a second factor to control the variance in a between-subjects design; and (3) using the order of treatments as a second factor to evaluate the order effects in a within-subjects design; explain the advantage of using a factorial design in these situations.

6. Explain how a correlation describes the direction, form, and strength of a relationship and identify these characteristics for a set of data, especially data presented in a scatter plot.

7. Identify the specific type of research design for each of the following scenarios:
   a. A researcher measures personality characteristics for a group of participants who successfully lost weight in a diet program, and compared their scores with a second group consisting of individuals who failed to lose weight in the program.
   b. A college offers all students an optional seminar in note taking and study skills. Suppose that a researcher compares personality scores for students who elected to take the seminar with the scores for students who did not.
   c. To evaluate the effectiveness of a new television commercial, a researcher measures attitudes toward the advertised product for a group of consumers before and after they view the commercial.
   d. Last fall, a state college introduced a one-week study skills course for new freshmen students. At the end of the academic year, the college compared the grades and dropout rate for their freshmen with the corresponding measurements for freshmen at a neighboring state college.
   e. A researcher compares self-esteem scores for children from divorced families versus scores for children from families with no divorce.
   f. A researcher introduces a new mathematics program in one school district and uses a neighboring district as a no-treatment control group. Before the program begins, the students in both districts are given a standardized mathematics test. After the program is in place for six months, the students are tested again and the researcher compares the before and after scores for the two groups.
   g. A clinical psychologist measures body satisfaction for a group of clients diagnosed with anorexia nervosa each day for one week before and for one week after the psychologist begins a series of group therapy sessions.

**Physiological Psychology**
KSC: Understand the function, anatomy, and, physiology of cells in the nervous system.
1. Identify and describe the main parts of neurons.

2. Describe the process of an action potential. Include the terms membrane potential, threshold of excitation, depolarization, hyperpolarization, repolarization, sodium ions, potassium ions, sodium channel, potassium channel, and refractory period.

3. Describe how neurons communicate with each other. Include the terms action potential, vesicle, neurotransmitter, synapse, and synaptic cleft.

4. What are excitatory postsynaptic potentials (EPSPs) and inhibitory postsynaptic potentials (IPSPs) and how are they related to neural integration.

5. Identify two differences between motor and sensory neurons.

KSC: Understand the physiological mechanisms of perception.
1. In general terms, what happens during the process of transduction?

2. From eye to primary visual cortex, how do we see? (Answer should be very comprehensive.)

3. From ear to primary auditory cortex, how do we hear? (Answer should be very comprehensive.)

4. Compare the dorsal stream to the ventral stream for both the visual system and the auditory system. Your answer must include the types of information processed and the brain structures involved.

5. What is the difference between the primary somatosensory cortex and the primary motor cortex? What might happen if there is brain damage to the left primary somatosensory cortex? The right primary motor cortex?

KSC: Understand neural regulation of motivation and emotion.
1. What are the basic functions of the following brain structures? hypothalamus, hippocampus, medulla oblongata, amygdala

2. What are the differences in function between the different nuclei of the amygdala? How does stimulation and damage of these different nuclei influence emotional behavior?

3. What hemispheric differences exist in terms of neural regulation of emotion?

4. What roles do serotonin and the ventromedial prefrontal cortex play in anger and aggression?

5. What is the main difference between the sympathetic nervous system and the parasympathetic nervous system? Identify at least five specific examples of this difference.
KSC: Understand neural regulation of learning and memory.
1. What role does the amygdala play in classical conditioning?

2. Compare the neural structures involved when learning new behaviors that require sequences of movements (e.g., tying your shoes) to the neural structures that are involved when these sequences of movement become automatic.

3. What are the roles of the neurotransmitters dopamine and serotonin in reinforcement? How do they relate to the ventral tegmental area and the nucleus accumbens?

4. Explain the role of the hippocampus in memory consolidation and storage.

5. What are differences in neural regulation of spatial memory compared to semantic memory? How might chronic use of GPS navigation systems affect spatial memory and the brain structures involved in spatial memory?

Psychology of Learning
- Understand the basic process of classical conditioning.
- Understand operant conditioning process including partial reinforcement schedules, and the negative reinforcement process of escape and avoidance conditioning.
- Understand the basic memory processes of encoding, storage and retrieval, the information-processing model and the characteristics each components of the memory system.

History & Systems
- Be familiar with the beginning and founding of psychology in Germany.
- Understand the beginning history of psychology in America, including structuralism and Titchener’s experimental psychology, the contributions of G. Stanley Hall, and early African American psychologists.
- Knowledge about the early years of applied psychology (e.g., clinical, industrial) and the early pioneers in industrial psychology (e.g., Münsterberg, Scott, Cattell).