

Senior Comprehensive Exam Question Bank Fall 2021

Instructions: The senior comprehensive examination in the Department of Psychology will include one question from each of the topic areas below. That is, one question from Social Psychology, one question from Statistics II, etc. These questions will be selected from the question bank below, with only minor edits. You will be required to answer four of the questions on the exam. So you will answer one question each in four different topic areas.

The faculty recommend that you prepare answers ahead of time in at least four course topic areas, and that students choose questions from areas in which they have taken coursework in the department.

Cognition

1. What is the major theoretical position that distinguishes behaviorism from research approaches used by psychologists before the rise of behaviorism? What advantages does behaviorism have over analytical introspection as a research method? Give an example of a mental process or ability that would be difficult or impossible to studying using introspection and explain why.
2. Describe the differences between implicit and explicit long-term memories. Name the two types of explicit long-term memories and describe how they are different. Provide an example of an implicit memory and explain why it is not explicit. Explain at least one source of evidence that implicit and explicit memories are supported by different cognitive systems.
3. In the domain of problem solving, what is an insight? What are ill-defined and well-defined problems and how do the two types of problems differ. What is the experimental evidence that suggests insights occur when solving certain types of problems? Are insights more likely to be helpful for well-defined or ill-defined problems, explain why?
4. Describe the Wason card selection task (aka four-card problem) and the mistake that people typically make in the task. How does the task relate to the falsification principle? What do the results of experiments that have used abstract and concrete versions of the four-card problem indicate about the roles of concreteness and pragmatic schemas in judging the validity of a rule?
5. What is the cocktail party effect and what does it demonstrate about attention? Explain why Broadbent's Early Selection Model of Attention cannot explain how people are able

to overhear their own name even when focusing on another speaker. Explain why Treisman's Attenuation Model and the Late Selection Model of Attention can account this phenomenon.

6. Describe how both top-down and bottom-up information play a role in perceptual processes such as object recognition and speech segmentation. Give an example of a situation where top-down information would not be very useful and a person would need to primarily rely on bottom-up information. Give an example of a situation where people must make use of top-down information in order to interpret bottom-up information.
8. Define what phonemes are and explain their importance in language. Define what morphemes are in language and how they differ from phonemes. What is the mental lexicon and what information does it contain?
9. Label and describe the two independent effects that create the serial position curve in memory recall test results. For both effects, describe an experimental condition that can eliminate the effect while preserving the other and explain why. Explain why serial position effects are seen as evidence for the separation of short-term and long-term memory systems.
10. Describe the major differences between short-term memory in the three-store model of memory developed by Atkinson and Shiffrin and the multicomponent model of working memory developed by Baddeley and colleagues? List at least three components of working memory and describe the role that each component plays.

Abnormal Psychology

1. Danny's Situation:

Since a gunman opened fire in his school 4 months ago, Danny, an 11th grader in high school has been refusing school and showing school phobia manifested in the form of an array of physical and emotional symptoms. He has constant thoughts about death/dying when it is in school. This might make him overly emotional so much so that he needs to see the school counselor, nurse, principal, and sometimes leave school to go home where he can play his favorite video games or go online where he wants. Dizziness, heart palpitations, dry mouth, excessive sweating, breathlessness, nausea, and full-blown panic attack are symptoms he expressed. Otherwise, he is usually very quiet even before the school shooting. However, he does not speak about his phobia, but he shows avoidance behavior

like complaining about bodily concerns, or using other excuses to avoid going to or staying in school.

Using Danny's situation above as an example, explain if he may have a mental disorder or not by discussing:

- a. What one still needs to know about Danny's symptoms (50% of question)
- b. What makes one's behaviors a mental disorder (50% of question)

2. Read the case scenario below and explain Danny's behavior using a behavioral paradigm with a combination of Classical Conditioning (50% of question) and/or Operant Conditioning (50% of question) theories to explain the beginning and maintenance of Danny's school phobia symptoms.

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3. What is the difference between fear and phobia? What differentiates normal anxiety we all feel from the anxiety experienced by someone with Generalized Anxiety Disorder (GAD). Use one of the theories listed to explain GAD (Freud/Psychodynamic, Rogers/Humanistic, Biological, or Ellis/Cognitive). Include in your response one advantage and one disadvantage of the theory you selected. Additionally, please identify a central feature of all anxiety disorders? In your response include the role of conditioning in anxiety.

4. Describe the symptoms that define unipolar depression and generalized anxiety. How are these two problems similar? How are they different from one another? Are they best treated by the same treatment protocol or different treatment protocols? Explain your answers.

5. Describe the symptoms of attention deficit hyperactivity disorder (ADHD). Include in your response the 3 groups that symptoms fall under, the 3 types of ADHD, and list at least 1

disorder that commonly co-occurs with ADHD? Also, describe 2 common forms of treatment for ADHD and the effectiveness/prognosis for each treatment you described.

6. What are the major clinical differences between patients with anorexia nervosa and patients with bulimia nervosa? What clinical features do these two forms of eating disorders have in common? In what ways is the clinical outcome of patients with anorexia nervosa different from the clinical outcome of patients with bulimia nervosa?

Media and Psychology

1. Describe two types of fandom and their pros and cons.
2. What policies would you put into effect concerning the production of violent media and explain, in detail, the psychological data that supports your policies. What are the major effects of watching violent media?
3. Do you believe that "love" can exist between a robot (AI Avatar) and a human. Using psychological theories explain why or why not.
4. Describe the clash between the First Amendment and studies on media violence's effect on children. How can society reconcile this clash?
5. Deconstructing a film with the DPI method should help individuals gain a greater appreciation for how media creates an emotional and attitudinal impact on a person and how psychological principles inform media production. Pick a film (not seen as part of the class) and discuss the emotional and attitudinal impact of the film on you and how psychological principles (as seen through the DPI framework) created that emotional and/or attitudinal impact.
6. Explain how media shapes our attitudes towards race and gender using psychological concepts, including modeling and stereotyping. Give at least two specific examples.
7. Using research to support your arguments describe if psychological research supports restricting any forms of free speech.
8. What do studies report are the pros and cons of social media?
9. Describe what research indicates about the effects of pornography in the media?
10. Describe how media is changing education and the research that supports its effectiveness.

11. What would be the best way to teach about the history of Howard University using the media? Discuss the wide range of options from documentary to docudrama to docu-fiction to novels to podcasts. Explain your answer.

Developmental

1. Based on the work of Diana Baumrind (1967) and later Maccoby and Martin (1983), the following four distinct parenting styles have been identified; and each is associated with a series of specific behavioral outcomes for children/adolescents: 1) Authoritarian; 2) Authoritative; 3) Indulgent/Permissive; and 4) Neglectful/Uninvolved.
 - a. Think back to your own upbringing and identify one parenting style from the list above that closely resembles the one used by one or both of your parents.
 - b. Explain why you selected that particular style and not the others by discussing the characteristics related to each of the four styles.
 - c. For the parenting style you selected, do you feel that your behavioral outcomes (e.g., academic performance, social skills, self-esteem, etc.) are consistent with those proposed by the theory? Why or why not?
2. Throughout your time as a psychology major you have been exposed to theories that attempt to explain various aspects of development throughout the lifespan. Imagine that a friend of yours is interested in becoming a developmental psychologist and asks you to describe one of the following developmental theories: 1) Cognitive; 2) Moral; 3) Psychosexual; 4) Psychosocial. Identify an author and the main components associated with ONE of these four theories cited above to share with your friend.
3. Please answer BOTH a. and b.
 - a. What is the “Nature vs. Nurture” debate in psychology? How might a developmental scientist seek to determine whether “nature” or “nurture” was a major contributing factor in a child’s development?
 - b. What is the definition of a “critical” or “sensitive” period in child development? Pick one area of development that you learned about in class (language, walking, identity, etc.) and describe the critical period associated with this particular skill or ability.
4. Sarah is **three** years old. In recent months, her mother has been somewhat perplexed by several observations about her daughter, as described below. For each of the two incidents below, use a developmental theory to offer your best explanation for Sarah’s behavior. For

full points, you must describe the entire theory and specify the separate constructs that apply to the two incidents.

- a. Sarah and her brother are sitting directly opposite from one another at the breakfast table. Sarah believes her brother can see exactly what she can see from her seat and is confused when he says he can't see out of the window that is behind him.
 - b. Sarah and her brother each receive 50 cents to buy ice cream. Her mother gives Sarah two quarters and her brother gets five dimes. Sarah throws a mini tantrum because she insists her brother has more money than she does.
5. a. What are the three stages of prenatal development?
- b. What are teratogens (give examples) and explain how can they impact child development during the prenatal stages?

Neuropsychology

1. Cognitive and affective processes are lateralized in the brain. Present evidence to support this proposition.
2. Looking back at the history of neuropsychology, trace the changing views about the relationship between the brain and mind/behavior.
3. Imagine that for one week you suffered from damage to a brain structure or brain region. Identify the brain structure or brain region and provide a detailed description of the difficulties you would experience as a consequence of this damage.
4. Discuss the support role of prefrontal cortex in cognitive and emotional processing.
5. Does damage to Broca's area cause Broca's aphasia? Justify your answer.
6. How do social environments influence human gene expression in the brain and physical health?
7. Distinguish between the James-Lange, Cannon-Bard, Schacter-Singer, and Ledoux theories of emotions.
8. Distinguish between a valence theory and a right hemisphere theory of emotion.

Race and Racism

1. Discuss a definition of racism provided by an individual who is a psychologist, and compare it to a definition that has been offered by a person who is not in the field of psychology. In your estimation, which is the stronger of the two definitions.
2. Forty-five years ago, James Jones, a social psychologist, published the book, *Prejudice and Racism (1972/1997)*. He identified *individual*, *cultural*, and *institutional* forms of

racism. Discuss each manifestation of racism in terms of the **subjects** and **verbs** in the definitions Jones provided. Does the notion of power enter into Jones's definitions of the various forms?

3. Scholars across many disciplines have published formal definitions of racism. Select two definitions, identify the author's academic discipline, and summarize their essential propositions. Compare and contrast the *subjects* (actors) and *verbs* (modes of actions) that each definition specifies.
4. Scholars across many disciplines have published formal definitions of racism. Select two definitions, identify the author's academic discipline, and summarize their essential propositions. Compare and contrast the *subjects* (actors) and *verbs* (modes of actions) that each definition specifies.
5. Racism is known to impact three regions of cognitive activity. Identify and describe each of these domains. Provide an example of racist cognitions in each region.
6. Cite two course-specific issues for which you have changed your mind about from before you took the Race and Racism vs. after. If there are not two such issues, explain why not.
7. In your view, is Culture the best route for understanding the psychological functioning of Black people? If your answer is yes, why? If your answer is no, why not?

Personality

1. Name and describe each of the 5 dispositional traits within the Big Five Model of Personality Traits (McCrae & Costa, 1985). Explain what personality psychologists mean when they describe personality traits as having longitudinal consistency. Also, identify and explain at least one distinction between personality traits and personality characteristic adaptations.
2. Describe Jones (1991) argument about "Black personality". In so doing, make sure you identify the conclusion and premise of his argument. In addition, identify and discuss one strength and one weakness of his argument.
3. Compare and contrast idiographic and nomothetic approaches to studying human personality. In addition, identify one weakness and one strength of each approach for advancing understanding of human personality and culture.
4. Explain each of the following components of the Life Story Theory of Identity as conceptualized by Singer (2005): Ideological settings; imagoes; nuclear episodes; and the generativity script. Next, apply one of the components of this theory to interpret the narrative identity of Michelle Obama using at least one example from Obama (2018). Your narrative identity explanation and interpretation should be complete, concise, and well-written.
5. Discuss why Schultz and Lawrence (2017) argue that psychobiography is both a theory and method. Then develop an argument about how psychobiography can expand understanding of

a person's personality. Include a conclusion and at least one premise in your argument. Your discussion and argument should be complete, concise, and well-written.

6. Based on your understanding of human personality from various personality scholars, address the following question: How would you explain the observed therapeutic effect of a person deriving meaning from his/her life experiences in the form of narrative identity? In your answer, be sure to include a definition of narrative identity from either McAdams & McLean (2013) or Singer (2005). Make sure your answer reflects both an understanding of the psychological processes involved in a person's narrative identity construction (e.g. narrative meaning and autobiographical reasoning) and specificity with respect to associations of narrative identity to positive psychological outcomes. Your answer should also be complete, concise, and well-written.

Psychology of Gender

1. What is the difference between sexuality, gender, and sex (not the act). Give 2 examples of how gender and sex are conceptualized on a continuum i.e. (How is gender understood on a continuum, how is sex understood, two examples of how both together can appear.)

2. Caster Semenya, the record-breaking track star from South African has made history in the world of international track particularly in the women's 800. However, she has been a source of controversy since she entered international competition years ago. Name 3 issues related to her gender which have been potential roadblocks for her. A few years ago Semenya married her long-time partner, a woman from South African.

The International Association of Athletics Federation (IAAF) the governing body of international sports, ruled last year that unless Semenya took specific measures she would be banned from competing in international women's track. The ruling was reversed however it will soon be re-presented to a higher court in Switzerland which will make a final ruling. Based on your knowledge of gender, sex and sexuality, create a rebuttal to the IAAF as to why their ruling should not be implemented.

Here are some issues to consider: What did the IAAF tell Semenya she would have to do to continue to run track internationally? What are the implications of the IAAF's ruling on Semenya? To what extent does this issue impact other elite male and female athletes? How would the court's findings impact women and girls and men and boys in sports around the world? Is the intersectionality of race and gender relevant or really irrelevant in her case? Are there other issues which is driving her case? How can your testimony be

incorporated into the development of policy in the IAAF? Finally do these findings have an impact on the broader LGBTQ community and if so how?

3. The study of gender traditionally focused on developmental differences between boys and girls, and men and women. Identify 2 studies and their findings which have informed the development of both sexes and in what ways.

4. Please define these terms:

- a. cis woman
- b. cis man
- c. trans woman
- d. trans man
- e. gay woman
- f. gay man
- g. intersex individual
- h. gender fluidity (give an example)

Social Psychology

Note: The Social Psychology question will be selected from those below. Minor edits are possible.

1. Name and define the three components or facets of the self, and describe one measure for each of the three components of the self. Describe one research study, including methods and results and concepts, which illustrates how people work to maintain a positive view of the self.
2. Describe one research study that illustrates some facet of the broader topic of social influence, which includes conformity, compliance, obedience, dissonance or persuasion.
 - a. What was the procedure of that study, as the participant experienced it.
 - b. Describe the key findings or results, being as specific as you can.
 - c. What do these findings tell us about how human beings can be influenced by one another?
3. Imagine someone is physically injured in a public place. Name and explain THREE different variables that decrease the likelihood that person will receive help from any one person who passes by. Provide scientific evidence or examples that show evidence of the impact of these three variables in decreasing helping. Finally, if you needed help,

what could you do to make sure these three variables did not prevent you from getting the help you needed?

4. Imagine you would like someone to be romantically attracted to you. Other than physical attractiveness, name and explain THREE different variables that increase the likelihood that someone would be attracted to you. Provide scientific evidence or examples that show evidence of the impact of these three variables on increasing attraction. Finally, name one variable that is important to longer term relationships which is not for early attraction, be specific in providing evidence for this from psychology.
5. Aggressive behavior is a problem in cities around the country, including Washington, D.C. Name and explain key social psychological theories, hypotheses, definitions and ideas that could be used to create circumstances that would decrease or limit violence. Using these notions from basic social psychology, make two concrete suggestions of policy changes that clearly relate to these ideas and have the potential to reduce aggressive behavior.
6. Name and explain the key elements of one theory of helping behavior in social psychology. Then discuss how the immediate situation, the individual's personality, and something about the nature component of who they are (biology, physiology or genetics) that might make helping behavior more likely.
7. Describe one research study that illustrates some facet of the broader topic of social influence, which includes conformity, compliance, obedience, dissonance or persuasion.
 - a. What was the procedure of that study, as the participant experienced it.
 - b. Describe the key findings or results, being as specific as you can.
 - c. What do these findings tell us about how human beings can be influenced by one another?

Research Design and Analysis

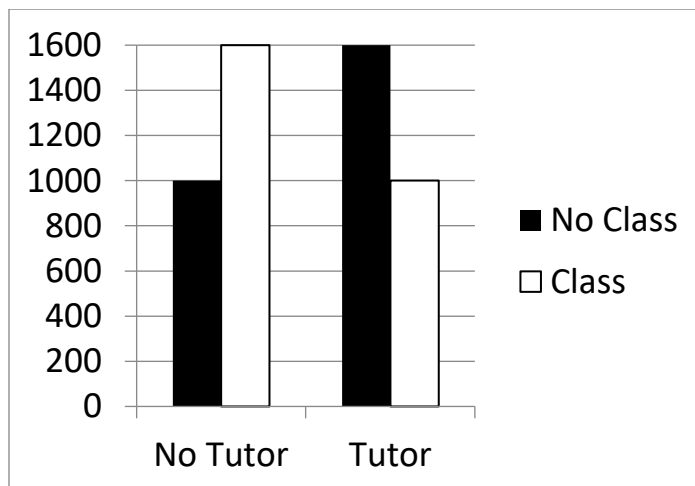
1. Pick two of the variables below and design an experimental study that tests the relationship between the two variables. Explain what an independent variable (IV) is and what a dependent variable is in general. Designate one of the two variables as the IV for your experiment and one as your DV. Explain your procedure, your experimental conditions, your sample population and how large your sample needs to be and how conditions will be assigned. What kind of conclusions could you draw from this experiment?

Possible variables for question: Self-esteem, fear, prejudice, aggressive behavior, attraction, jealousy, Black versus White race, depression, anxiety, thinking a lot versus a little, being asked to remember something now or an hour later, helping behavior, rejection, extroversion/introversion, gender, smiling or frowning facial expression, heart rate, arousal, or stereotyping.

2. Define random sampling (also known as random selection). If a study has random sampling, name and define the type of validity that this strengthens and explain why this is the case. If there is no random sampling, how does that limit the research conclusions that can be drawn from the study?

Now, define random assignment. If a study has random assignment, name and define the type of validity that this strengthens and explain why this is the case. If there is no random assignment, how does that limit the research conclusions that can be drawn from the study?

3. The graph below indicates a set of findings in an experimental study where participants are randomly assigned to either receive a preparatory class or not, and they either receive tutoring or not. This is a 2 x 2 Between Participants experimental design. Then their performance was measured on a standardized SAT test with scores from 0 to 1600.
 - a. Name and then describe the effect(s) that are present.
 - b. Based on these findings, give advice to a friend, should they take tutoring, a prep class, both, or neither and justify this based on the graph.



4. Pick one of the Examples below and use it to answer the following questions (a.-d.):

- a. What error is Dr. Dummy making in this example in regards to correlation?

- b. Name and explain something that is **missing** from each example which could explain the observed correlation.
- c. Describe an explanation for the relationship that is different from the one Dr. Dummy gave.
- d. Overall what problem is this an example of and what does it tell us about the limitations of correlational research?

PICK

Example 1: Dr. Dummy observes that there is a correlation between an elementary school child's foot size and their reading ability, he concludes that foot size must cause greater reading ability.

OR

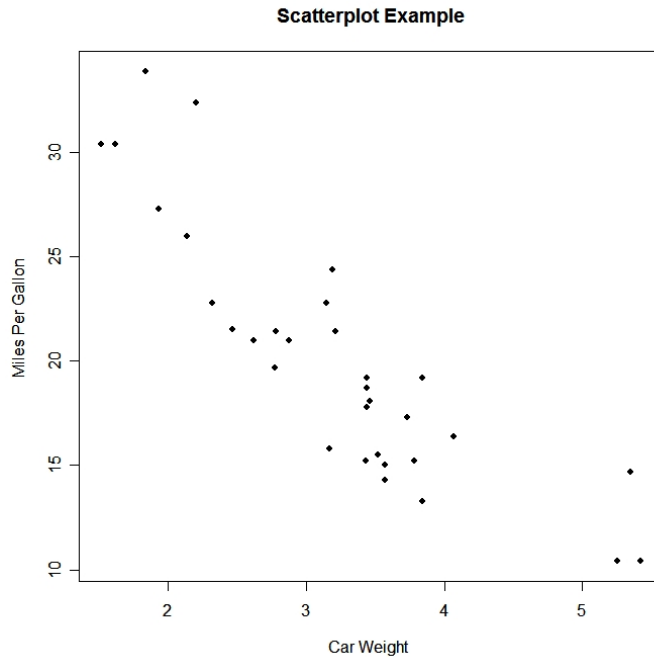
Example 2: Dr. Dummy observes that individuals who take vitamins are correlated with being healthier overall, he announces that vitamins cause improved health.

OR

Example 3: Dr. Dummy observes that red cars are correlated with more speeding tickets and he concludes that the color of the car causes them to be pulled over more.

5. Estimate the Pearson's r for the relationship portrayed here and tell us what the value of r that you have selected means for the direction and magnitude of the relationship. Write two sentences interpret the meaning of that relationship. If you wanted to get

the best mileage possible, what does this tell you about the type of car you should buy?



6. **Pick two** of the three pairs of terms below. Explain what each term means, and then explain how the two terms relate to each other in the topic of research ethics:

confidentiality and anonymity

deception and debriefing

level of risk and Institutional Review Board

7. Consider the four **scales of measurement** in social and behavioral research. Name all four scales of measurement and explain what each is, using an example that clearly illustrates that scale of measurement. Scales of measurement have implications for what you can do with the resulting data. Give two examples of how a scale of measurement either allows or limits what you can do with the data that result from that scale of measurement.

Statistics I

Note: The Statistics I question will be selected from those below. The specific numbers in the question will be changed, and minor edits are possible.

1. Describe a situation in which a paired-sample (or dependent-sample) *t*-test would be used. Your answer should include 1) an example of an experimental study for which a

paired-sample t -test would be best suited; 2) null and alternative hypotheses of the study; and 3) a brief description of how you would perform the statistical test.

2. Describe the logic behind the null hypothesis significance testing. Use the context of comparing two group means (e.g., anxiety scores from treatment and control groups). You must clearly explain on what grounds you would reject the null hypothesis or fail to reject it. Your answer may include some—but not necessarily all—of the following concepts: sample/population mean, null/alternative hypothesis, test statistic, significance level (or alpha level), critical value, rejection region, p -value, chance, Type I/II error, and statistical significance.
3. Describe the different goals of descriptive and inferential statistics. In doing so, include an example that involves a certain variable's "mean." Your answer must also include the following concepts: population, sample, parameter, statistic, hypothesis testing (or confidence interval), and any others if you deem them appropriate.
4. Consider the process of conducting a hypothesis test about a population parameter. Using the following table, which shows the cross-classification of your test decision and the true state of the null hypothesis. Answer the following question:

| | | Truth | |
|---------------|------------------|------------|-------------|
| | | H_0 True | H_0 False |
| Test Decision | Reject H_0 | | |
| | Not Reject H_0 | | |

Explain the concepts of type-I error rate, type-II error rate, and power in statistically precise terms as they relate to the four cells of the table. In doing so, you may want to define the case corresponding to each cell and its probability.

5. Are children who have been home-schooled less socially intelligent than those who have gone to public school? To try to answer this question, twenty home-schooled 6th graders and twenty 6th graders who have exclusively attended public schools are randomly selected, and each child is given a social IQ test. The mean for the public school student sample was 8.7, with $s = 1.2$, and the mean for the home schooled sample was 5.5, with $s = 1.1$. Results indicated a statistically significant difference in the social IQ scores of the home-schooled children and the public school students.

Answer all six of the questions (a) – (e) listed below. Please note it is not enough to answer the following questions by merely listing facts. You should present a cogent argument based on your critical analysis of the questions posed, using appropriate psychological terminology.

- (a) What is the independent variable of this study? And what are the levels of the independent?
 - (b) Describe how the researchers measured the dependent variable.
 - (c) Create a bar graph illustrating the results of the study. Correctly label each axis.
 - (d) Can the researchers conclude that there is a cause-and-effect relationship between the independent and dependent variables? If so, why? If not, why not?
 - (e) Explain what statistical significance means in the context of the study.
6. A psychologist wants to test whether there is any difference in puzzle-solving abilities between boys and girls. Samples of boys and girls were chosen at random among fourth graders at a public school, and time spent on solving a certain puzzle was measured for each of the participants. The question of interest is whether we can conclude, at the .05 level of significance, that the mean puzzle-solving times for boys, denoted by μ_1 , is *greater* than the mean puzzle-solving times for girls, denoted by μ_2 .

Answer all five of the questions (a) – (e) listed below.

- (a) Identify the independent variable of the study *and* the attributes (or levels) of the independent variable.
- (b) Identify the dependent variable and describe its meaning in this study (i.e., what it represents or how it is defined).
- (c) Using the symbols for two population means (i.e., μ_1 and μ_2), state the null and alternative hypotheses H_0 and H_1 , respectively.
- (d) Suppose that a null hypothesis significant test is performed to answer the question of the study. Explain in words the procedure of conducting the test (i.e., what to compute and how to make a decision).
- (e) Explain what “statistical significance” means in the context of the study.

Statistics II

1. Analysis of variance (ANOVA) is a statistical test whose result is based on the analysis of different sources of variability in data. In its simplest form, one-way between-participants ANOVA compares between-group variance to within-group variance in data, in order to test whether there exist statistically significant differences among three or more group means. State the logic behind ANOVA by describing how analyzing between-group differences relative to within-group differences in data can lead to a statistical conclusion. Your answer may use an example of an experimental study to which one-way between-participants ANOVA would be applied.
2. Describe the logic behind the null hypothesis significance testing. Use the context of establishing a linear association between two continuous variables in a regression

analysis (e.g., predicting response time from task difficulty in a choice task). You must clearly explain on what grounds you would reject the null hypothesis or fail to reject it. Your answer may include some—but not necessarily all—of the following concepts: sample/population regression coefficient (or correlation coefficient), null/alternative hypothesis, test statistic, significance level (or alpha level), critical value, rejection region, p-value, chance, Type I/II error, and statistical significance.

3. Linear regression analysis involves the following three sources of variability in the dependent variable: SSE (sum of squares error), SSR (sum of squares regression) and SST (sum of squares total). Interpret each of these quantities and their algebraic relationship. Your answer must also include the definition and interpretation of “R squared” (or the coefficient of determination) in terms of these sums of squares.

4. A psychologist is interested in people's views on various crimes. She has produced videotaped re-enactments of two different, non-violent crimes—jewelry theft and perjury—and has asked viewers to give the length of the prison sentence (in months) the perpetrator should get as punishment. The psychologist is looking at differences in the perceived seriousness of the crimes and also at whether there is an influence of the viewer's self-reported political position as conservative or liberal.

The psychologist randomly selected an equal number of conservatives and liberals to be viewers. She divided each group into two subgroups of equal size. She had each subgroup watch the re-enactment of a particular crime. After collecting the participants' prison sentence judgments, she computed the mean judgment for each of the four groups. Shown below is the table of results:

| | Conservative | Liberal |
|---------------|--------------|---------|
| Jewelry Theft | 27 | 18 |
| Perjury | 24 | 26 |

Answer all six of the questions (a) – (f) listed below.

- a. Identify the independent variable(s) of the study *and* the attributes (or levels) of the independent variable(s).
- b. Identify the dependent variable and describe its meaning in this study (i.e., what it represents or how it is defined).

- c. Create a line graph illustrating the results of the study. Correctly label each axis and line.
 - d. Explain in words what an “interaction effect” means in this particular study.
 - e. Suppose that a statistical test is performed at the significance level of .05 to see whether there is an interaction, and a p -value of .007 is obtained. What is the result of the test and how you know it?
 - f. Independent of your answer to (e), explain what “statistical significance” would mean in testing for an interaction in this study.
5. A superintendent of a public school district has decided to test whether the educational backgrounds of students’ parents in her district are different from those of general American adults (> age 25). She has the following information on the American adult population as a whole, obtained from a recent U.S. Current Population Survey:

| Highest degree earned | Less than high school | High school | College | Higher than college |
|-----------------------|-----------------------|-------------|---------|---------------------|
| Percent of population | 12% | 25% | 55% | 8% |

The superintendent also obtained data for a random sample of 200 parents. These data are summarized in the first row of numbers in the table below. These numbers are the observed counts in the sample of 200 for each of the degree categories. The second row of numbers in the table gives the expected counts under the assumption that the null hypothesis being tested is true. The bottom row gives the values that are necessary in the process of computing the suitable test statistic. Answer all of the questions below:

| | Less than high school | High school | College | Higher than college | Total |
|-------------------------|-----------------------|-------------|---------|---------------------|-------|
| Observed Counts (O) | 25 | 35 | 127 | 13 | 200 |
| Expected Counts (E) | | 50.00 | | | |
| $\frac{(O - E)^2}{E}$ | | 4.500 | | 0.563 | |

- a. Given the above data, the superintendent wants to perform a statistical test to see if the distribution of highest degrees earned by the district’s parents is the same as the distribution of highest degrees earned by American adults as a whole. What kind of a statistical test is suitable?
- b. State the null and alternative hypotheses, respectively.
- c. Fill in the six missing values of the table. Round your responses for the expected counts (second-to-last row) to at least two decimal places. Round your responses for

the last row to at least three decimal places. Write the numbers in your answer sheet (from left to right and top to bottom).

- d. To obtain the p -value of the test, we need to compute a value of $\Pr(\chi^2 > [\] ; df = [\])$ using a statistical calculator. What are the two values we need to enter?
- e. Suppose that the value of $\Pr(\chi^2 > [\] ; df = [\])$ from the calculator in the above is **.052**. We want to use the **.10** level of significance to perform the test. Copy the following to your answer sheet and make it a correct statement: Based on this test, we conclude that the data provide / do not provide (choose one) convincing evidence that (fill here).