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| MC (60) |  | **Stats Test #2: Conceptual Closed Book Portion v.2** | **Name: ID:** |  |  |
| FB (60) |  | Explain the logic of hypothesis testing underlying the following problem. The Speedy Shopper, your grocery store, promises you will not wait more than 2 minutes (on average) in the check-out aisle. Assume that in your last 7 trips you waited an average of 4 minutes, and that you want to determine if you can reject the store’s promise as untrue. Explain the logic of hypothesis testing you would use to test this claim with a 1-sample t-test. For example, your answer should address how you are attempting to distinguish between the influence of sampling error and the potential influence of a treatment effect. *Do not do any calculations.*   * Your answer should mention [though not in this order] the sample mean, the population mean of the Ho distribution, the expected difference, the observed difference, the critical and obtained t values, and standard error, treatment effect, and sampling error. It should also include a picture of the sampling distribution appropriately labeled and reference to the specifics of this example. | | | |
| Essay (30) |  |
| Comp (100) |  |
| Total (250) |  |
| Grade |  |
| MC (5 pts)  1. \_\_D\_\_ 2. \_\_B\_\_ 3. \_\_A\_\_ 4. \_\_B\_\_ 5. \_\_C\_\_ 6. \_\_D\_\_ 7. \_\_A\_\_ 8. \_\_C\_\_ 9. \_\_D\_\_ 10. \_A\_\_\_ 11. \_A\_\_\_ 12. \_C\_\_\_ 13. \_B\_\_\_ 14. \_D\_\_\_ 15. \_A\_\_\_ 16. \_B\_\_\_  Fill-in (5 pts)  1. \_Predictor\_ 2. \_Power\_\_ 3. \_\_Expected\_\_\_ 4. \_Sampling Distrb\_ 5. \_β\_\_ 6. \_\_SS\_\_\_\_\_\_\_ 7. \_\_Mean Diff. \_ 8. \_Effect\_\_\_\_\_ 9. \_\_practical\_ 10. \_treatment eff\_\_ | |

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## Multiple Choice (5 points each)

1. As n increases, the shape of the t-distribution becomes \_\_\_\_\_ and t-critical \_\_\_\_\_\_\_
   1. less like a z-distribution; increases
   2. less like a z-distribution; decreases
   3. more like a z-distribution; increases
   4. more like a z-distribution; decreases
2. When doing a t-test, a larger difference between the sample and population mean makes which thing more likely?
   1. the presence of sampling error
   2. the presence of a treatment effect
   3. that you can retain the Ho
   4. that you can reject the Ha
3. If the probability level associated with a t-test is .007, we would do which of the following?
   1. reject the Ho
   2. recognize the chance of a treatment effect is 0.7
   3. conclude there is too much error to say there is a treatment effect
   4. a & b
4. When doing a t-test, a decrease in the variability of the raw scores gives the experimenter
   1. more sampling error
   2. more power
   3. a higher standard error
   4. a larger treatment effect
5. Which of the following indicates the degree of impact of the independent variable on the dependent variable?
   1. power
   2. inferential statistics
   3. the d statistic
   4. the t statistic
6. If Beta (β) increases, which of the following must be true?
   1. treatment effect increases
   2. alpha (α) decreases
   3. sampling error decreases
   4. power decreases
7. If an author reports “t(59) = 3.19, p<=.05” she is telling you…
   1. the probability of Type I error is equal or less than 5%
   2. the probability of Type II error is equal or less than 5%
   3. there is too much sampling error to conclude that a treatment effect is present
   4. there is a 3.19% chance the observed difference is due to chance
8. If z-obtained equals 1.99, one could conclude that….
   1. the chance of obtaining this result by chance is less than or equal to 99%
   2. there is no treatment effect
   3. the sample comes from a different population than the Ho distribution
   4. the chance of a type I error is zero
9. A sampling distribution
   1. shows the distribution of *scores* based on sampling error
   2. shows the size of the treatment effect
   3. shows the amount of power from the treatment effect
   4. is based on the assumption the null hypothesis is true
10. When doing an independent t-test, the \_\_\_\_ hypothesis states the means are \_\_\_\_\_\_\_\_.
    1. null; equal
    2. null; not equal
    3. research; equal
    4. research; not equal
11. Cohen’s d statistic expresses the effect size in terms of \_\_\_\_\_\_\_
    1. standard deviation units
    2. variance units
    3. variance accounted for
    4. mean units
12. You want to know if the advertized average class size for a university (20 students) differs significantly from the average class size in your sample of 9 different classes. Which statistic would be the most appropriate?
    1. correlation
    2. effect size
    3. one-sample t-test
    4. two-sample t-test, independent
13. You want to know if job satisfaction is related to job performance. You have data from 60 people. Which statistical procedure is most appropriate?
    1. Regression
    2. Correlation
    3. Independent t-test
    4. Dependent t-test
14. You want to know if the attractiveness of job applicants affects the assessment of their credentials. You have people rate two applicants each by looking at resumes with pictures. The supposed applicants are matched on their job-relevant qualifications. Which statistical procedure is most appropriate?
    1. Independent t-test
    2. Correlation
    3. Regression
    4. Dependent t-test
15. Which of the following statements is TRUE?
    1. True differences are more likely to be detected if the sample size is large.
    2. A very low significance level (p-value) increases the chances of a Type I error.
    3. If the d statistic is a small number, a Type II error is unlikely.
    4. Rejecting the null hypothesis means the population means are equal.
16. What does it mean to say a result is statistically significant?
    1. The observed difference exceeded the expected difference due to sampling error
    2. The observed difference is too large to be reasonably attributed to sampling error
    3. Sampling error was so small as to be insignificant
    4. Sampling error was less than the observed difference
17. In regression, we call the variable on the “x” axis the \_\_\_\_\_\_\_\_\_\_.
18. Decreasing sampling error in an experiment gives the experimenter more \_\_\_\_\_\_.
19. When doing a t-test, the standard error of the difference tells you the difference \_\_\_\_\_ between means due to sampling error.
20. A \_\_\_\_\_\_ \_\_\_\_\_\_\_\_ [two-words] pictures the variability of means expected from sampling error alone.
21. The chance that an experimenter will fail to reject the Ho when it should be rejected is represented by \_\_\_\_\_ [symbol].
22. The abbreviation used by statisticians for the Sum of the Squared Deviation Scores is \_\_\_\_\_\_.
23. The measure of variability used in a two-sample dependent t-test is called standard error of the \_\_\_\_\_ [one or two words].
24. Both r2 and d are examples of \_\_\_\_\_\_-size statistics.
25. Both z and t are examples of tests for \_\_\_\_\_\_\_ significance.
26. If the IV affects the DV we call this impact a \_\_\_\_\_\_\_ \_\_\_\_\_\_\_. [two-words]

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| Fill-in (80) |  |
| Paragraph #1 (10) |  |
| Paragraph #2 (10) |  |
| Total Computation (100) |  |

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**Computational Portion Answer Sheet**

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| **1.** | **t=** | **3.138** | | | **Paragraph #1**  The hypothesis was supported. Participants rated wombats significantly higher (M=6.86) than warthogs (M=4.71), t(6)=-2.785, p≤.05. The effect of animal type on satisfaction was large, d=2.7867. |
| **2.** | **1.6** | | | **.510** |
| **3.** | **t(5) = 1.348, n.s.** | | | |
| **4.** | **d=** | **N/A** | | |
| **5** | **2** | | **Reject** | |
| **6.** | **0.62%** | | | |
| **7.** | **2.28%** | | | |
| **8.** | **3.8** | | | |
| **9.** | **3.2%** | | | |
| **10.** | **d=** | **1.0531** | | | **Paragraph #2**  The hypothesis was supported. Participants picked up significantly more pencils when the person was attractive (M=10.33) than when unattractive (M=8.00), t(16) = -2.514, p ≤ .05. The effect of attractiveness on helping was large, d = .8370. |
| **11.** | **t(8) - -2.4064, p≤.05** | | | |
| **12.** | **2.33** | | | **.928** |
| **13.** | **d=** | **.8370** | | |
| **14.** | **t=** | **-3.5884** | | |
| **15.** | **\_A\_\_\_\_ & \_\_D\_\_\_\_** | | | |
| **16.** | **8** | | | |
| **17.** | **4** | | | |

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| *(for 1-2)* You measure people’s life satisfaction both before (6,4,5,6,7) and after (5,4,3,4,4) they watch TV show depicting fabulously wealthy families. *Using SPSS, test whether there is a statistically significant difference.*  **Computational Portion, Test #2, Open Book**  **(100 points total; 5 pts unless noted.)**   |  |  |  | | --- | --- | --- | | NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: |  |  |   **(100 points total; 5 pts unless noted.)** | | | | * 1. Report the tobt value.   Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_   * 1. Report the ***difference observed*** and the ***difference expected*** for this output. | | | | |
| *(for 3-4)* You test weather people that join fraternities or  sororities report having a lesser or greater number of close friends (6,4,5,7,7,5) than college students in general (5). *Using SPSS, test whether there is a statistically significant difference.* | * 1. Formally **summarize** the statistic.   2. Calculate the **effect size statistic** for this outcome or if not appropriate state “NA.”   Not sig. so not appropriate to do d. | | | | * 1. Are fully-caffeinated people smarter or dumber than normal? You find 25 fully-caffeinated people average 106 on an IQ test (μ = 100, σx = 15). State the correct **test value** and indicate whether your **retain or reject** the Ho.     n =25  M = 106  μ = 100  σx= 15 | | | |
| * 1. What **percent** of students have a GPA **higher** than 3.7 (μ=2.7 & σ=0.4)?   x =3.7  μ = 2.7  σx= 0.4  Use z-score table in back of book…  Higher = Area beyond z=2.5 🡺0.62% | | | * 1. A therapy group of 9 individuals average 3.6 on a depression index. What percent of groups are less depressed than this (μ=4 & σ = 0.6)?   n =9  M = 3.6  μ = 4  σx= 0.6  .0228 beyond z=-2 🡺 2.28% | | | | * 1. In a sampling distribution for the previous problem, what raw score would be one standard unit below the distribution center?   The raw score in the center of the distribution is 4 (because µ =4). One standard error unit is 0.2, so one standard error unit below 4 is 3.8. | |
| **A researcher tested whether people prefer warthogs or wombats as pets. Each person had both types for one month; participants then rated their satisfaction with each of the two.** | | | | | | | | |
| * 1. What percent of time would you see this difference between the means solely by chance? | | * 1. Using the output above, calculate the effect size, or if not appropriate, state “NA.” | | | | | | |
| **Paragraph #1.** (10 pts) Write a paragraph explanation of the this outcome on the answer sheet. | | | | | | | | |
| * 1. By hand, test whether biker-gang members (M=8.67, n=9, sx = 1.658) eat more or less than the recommended serving of 10 fruits and vegetables per day. Formally **summarize** the statistic (you do not need to show hypothesis testing steps).   Find t-critical in table. With  M = 8.67  n =9  sx= 1.658  df=8 so t-critical =± 2.3060. | | | | | | | | |
|  | | | | | | | | *(for 12-14)* An experimenter manipulated the **attractiveness** of a person who dropped pencils in an elevator and then measured the number of pencils people **helped** pick up.   * 1. Indicate the difference **observed** and **expected**.   **Paragraph #2**. Write a paragraph explanation of this outcome in the space provided. |
| * 1. Calculate the effect size statistic or state “NA” if not appropriate. | | | | | | * 1. Recalculate t-obt by hand assuming the mean for the unattractive condition was 7.00. | | |
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| * 1. The correlation between which two variables is most likely due to chance? Largest p = .154   2. How many significant correlations are represented in this matrix? There are 8 starred relationships   3. A researcher wanted to estimate the variability of scores in a population based on her sample. Calculate the standard deviation where SS=64 and n=5 | | |