

Instructions

Calculators (simple & graphing) will be allowed along with one page with a single side of handwritten notes. You will receive a copy of the z- and t-table with this quiz. You will have the full class period (50 minutes minus setup time).

Formulas

No formulas will be provided with this quiz as you can bring a single side of notes.

1- versus 2- tailed tests

1. What is the critical z value(s) for 1-tailed test for an increase with $\alpha = 0.10$?
 - a. 1.28
 - b. 1.65
 - c. 1.96
 - d. 2.33
 - e. Not enough information

2. You are testing whether a sample mean is statistically different from a given population mean. $\alpha = 0.05$. Which of the following z values is considered statistically significant?
 - a. -0.5
 - b. -2.1
 - c. 1.7
 - d. Not enough information

3. What is the critical t value for a 2-tailed t-test. $N = 20$ and $\alpha = 0.01$
 - a. 2.093
 - b. 1.725
 - c. 2.086
 - d. 2.861
 - e. 2.528

4. Why is a 1-tailed test more sensitive?
 - a. If testing for an increase, it is not possible for the sample mean to be less than the population mean (and vice versa)
 - b. 1-tailed tests use a different alpha value
 - c. Compared to the two-tailed test, the sample mean does not have to be as far away from the population mean in the specified direction to be considered significant
 - d. 1-tailed tests are less prone to type I errors

t-test

Questions 5 – 8 use the following information:

It is known that the mean age of the population in Phoenix is 58 years old. A restaurant manager wants to know if the average age of his customers is different from that of the population. He surveys 15 customers and computes that mean = 62 and sum of squares (SS) = 910.

5. What is the estimate of the population standard deviation?
 - a. 7.79
 - b. 8.06
 - c. 60.17
 - d. 65.00
 - e. 30.17

6. Assume $\alpha = 0.05$. What is the critical t value? 2-tailed, .05, $df=14$
 - a. 1.761
 - b. 2.001
 - c. 2.145
 - d. 2.602
 - e. 2.947

7. What is the t value for the sample mean?
 - a. 0.07
 - b. 0.50
 - c. 1.92
 - d. 5.67
 - e. 14.68

8. What is the best conclusion from the above t value?
 - a. Power is very high
 - b. Reject the null hypothesis
 - c. $p > .05$
 - d. Type I Error

Power

Questions 9-11 use the following information:

The population mean is 10 and standard deviation is 4. Alpha is set to 0.05. We Expect an effect size of +5 and a sample size (n) = 6. (Hint: Sketch the distributions)

9. What is the critical sample mean?
 - a. 12.70
 - b. 13.20
 - c. 11.63
 - d. 15.00

10. What is the power for this effect and sample size?

- a. 2%
- b. 13%
- c. 42%
- d. 92%
- e. 99%

11. Which action is preferred for increasing power?

- a. Change effect size from 5 to 2.5
- b. Reduce the standard deviation by 50%
- c. Divide n in half
- d. Change α to 0.10

Confidence Interval

Questions 12-13 use the following information:

The director of Price Center is interested in estimating how much money the average student has on them in cash on any given day. She surveys 12 students and finds the average is \$25.60 with a standard deviation (s , not σ) of \$10.10.

12. What is the 95% confidence interval for the population mean?

- a. 15.50 to 35.70
- b. 19.18 to 32.02
- c. 20.72 to 30.48
- d. 22.68 to 28.52

13. The director wants to recalculate for a 99% confidence level. How will this change the margin of error?

- a. Decrease margin of error by approximately 5%
- b. Decrease margin of error by approximately 50%
- c. Increase margin of error by approximately 5%
- d. Increase margin of error by approximately 50%

Outcomes & Errors

14. What is the chance of a type I error?

- a. Alpha
- b. $1 - \alpha$
- c. Power
- d. $1 - \text{power}$
- e. Depends on the z score

15. If you want to reduce the chance of a false alarm, you would

- a. Decrease α
- b. Increase sample size
- c. Decrease variability
- d. Reject the null hypothesis

Conceptual

16. Statistical power is:
- The probability of rejecting the null hypothesis regardless of whether H_0 is true or H_1 is true
 - One minus the probability of a miss (or 100% - the percent chance of a miss)
 - The probability that your test will be statistically significant if the effect being measured is real
 - All of the above
 - B and C only
17. Which is true about parameters and statistics?
- Statistics describe populations, parameters describe samples
 - Statistics describe samples, parameters describe populations
 - Statistics and parameters can be used interchangeably
 - Parameters are values that are measured, statistics are theoretical
18. Which variable type is not correctly paired with the example?
- Nominal: Car model
 - Ordinal: Height
 - Interval: Fahrenheit temperature
 - Ratio – Mass
19. Why is the t-distribution different than the z-distribution?
- The t-distribution requires estimating standard deviation, which introduces additional error
 - The t-distribution is used for populations with are not normal
 - The t-distribution is used for smaller sample sizes
 - The t-distribution is used for estimating standard error
20. What pieces of information are needed for looking up critical t values?
- Degrees of freedom, alpha
 - Alpha, 1 vs 2 tailed, effect size
 - Degrees of freedom, alpha, 1 vs 2 tailed
 - 1 vs 2 tailed, degrees of freedom, sample size
 - Sample mean, 1 vs 2 tailed, effect size