

Final Exam Practice Test

- The t distribution and z-score distributions are located in the back of your text book (the appendices)
- You will be provided with a new copy of each during your final exam

True or false?

- When researchers choose an alpha risk of .05, they are revealing that five times out of a hundred they will claim statistical significance by chance alone.

- The statement is true. Alpha risk of .05 means that five times out of 100, real relationships will be claimed when, in fact, such "significant" effects are just sampling error.

True or false?

- In the logic of hypothesis testing, researchers attempt to find evidence to prove their research hypotheses.

- The statement is not true since it far overstates the case. Research hypotheses are not "proven." Instead, in the logic of hypothesis testing, researchers try to gather evidence that makes presuming the truth of the null hypothesis very unlikely.

True or false?

- Probability is the frequency that an event occurs in the population.

- The statement is true. The critical region is a part of the distribution isolated to identify occurrences that would very rarely occur at random. If the test statistic falls in that region, researchers reject the null hypothesis.

True or false?

- Alpha risk is the probability of committing a Type II error.

- The statement is not true. Alpha risk is the probability of committing a Type I error.

True or false?

- When researchers compare more than two means, analysis of variance is the statistical tool to be used.

- The statement is true. The analysis of variance (ANOVA) is designed to compare any number of means.

True or false?

- Analysis of variance reveals the location of differences among more than two means.

- The statement is not true. ANOVA reveals that a difference exists among several means, but it does not reveal the location of those differences. To isolate the locations, multiple comparison tests are completed.

Z-Score Example

- You found out that Mario Chalmers earns about 1.1 million dollars a year. Now you are curious how many NBA basketball players make more and less than his salary.
- What information do you need in order to calculate a Z score?

- Answer: You need your comparison score (Mario's salary) and the mean salary & SD of all NBA players
- Calculate Mario's z-score given a mean NBA salary of \$900,000 and with a SD of \$1,000,000

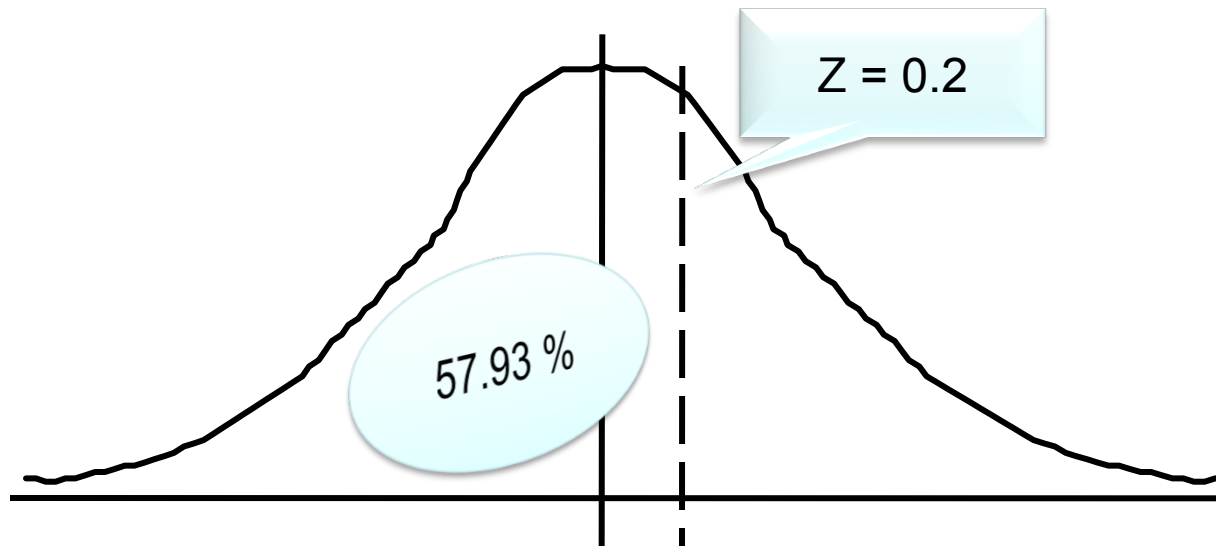
$$z = \frac{X - \mu}{\sigma}$$

How to do

- $= (1,100,000 - 900,000)/1,000,000 =$
 - $200,000/1,000,000 = .2$
 - Therefore his Z score is .2
- How many NBA players have salaries above and below Mario?

Answer

- Looking at the Z table, a .2 corresponds with a value of .0793
- This means that Mario makes more money than 57.93% of NBA players ($50\% + .0793$)



Another interpretation

- This also means that Mario makes less than 42.07% of the NBA players (50%-7.93%)
- Another way to look at this is $.50 - .0793 = .4207$, which is 42.07%

Independent Samples t-test

- A researcher wants to know the difference between Republicans and Democrats in their support of President Obama. He collects survey data from 258 individuals, and sets the alpha level at .05.
- H1: Democrats support Obama more
- Support measured on a 7-point scale: 7 = Strongly support, 1 = Do not support at all

Questions

- 1) What are the dependent and independent variables?
- 2) What is the null hypothesis?
- 3) What is df?
- 4) What is the critical t value?
- 5) If the observed t value is 1.81, do you reject or accept H_0 ?
- 6) What does this mean?

Answers

1. DV = support for Obama; IV is political party membership
2. H0 = There is no relationship between party membership and support for Obama
3. DF = (N-2) = 256
4. Critical t = 1.65 (One tailed hypothesis, alpha = .05, df rounded up 1.648)
5. Reject H0 because $1.65 < 1.81$
6. There is a significant relationship between political party membership and support for the president
 - You will want to check the means for both groups to make sure that Democrats have a higher score than Republicans

Paired Samples T-test

- A researcher conducts the experiment illustrated below, where X is taking COMS 356. She surveys 101 students before and after taking COMS 356. For her control group she surveyed students who took COMS 130 at the beginning and end of the semester. She believes that taking a statistics class will make individuals like statistics more. Liking statistics is measured on a 7-point Likert scale: “I love statistics” (7 = Strongly Agree, 1 = Strongly Disagree). She sets her alpha level at .01

<u>Group</u>	<u>Pretest</u>	<u>Treatment</u>	<u>Posttest</u>
Experiment	DV	X	DV
Control	DV		DV

Questions

- 1) What 2 paired samples t-test could she conduct, and what will they tell her?
- 2) What are dependent and independent variables?
- 3) What are the research and null hypotheses?
- 4) What is df?
- 5) What is the critical t value?
- 6) If the observed t value is 1.54, will she accept or reject H_0 ?

Answers

- 1) She can either compare her experimental group pre and post test scores (COMS 356), or her control group pre and post test scores (COMS 130)
 - The first will tell her whether taking COMS 356 increased liking of statistics
 - The second will tell her whether taking COMS 130 increased liking of statistics
- 2) DV: Liking of statistics; IV: Time
 - IV is not group membership, recall that a paired samples t-test is one group over time

Answers

- 3) H1: Taking COMS 356 will increase liking of statistics; H0: Taking COMS 356 will have no effect on liking of statistics
- 4) df on a paired samples t-test is N-1: $df = 100$
- 5) Critical t value = 2.364
- 6) Since $1.54 < 2.364$, she can reject the H0
Which suggests that taking COMS356 significantly increases liking of statistics
She will want to check the mean values to make sure that there was an increase of liking

Correlation example

- A researcher believes that more extroverted people are likely to believe that other people agree with them about everything. He believes that outgoing people are so comfortable talking with others that they think that other people are in agreement about what they communicate about. He gives a survey to 314 subjects and measures their level of extroversion (7 = very extroverted, 1 = very introverted). He also asks, “How often do you believe that other people agree with you about your opinions?” (7 = all the time, 1 = never or not at all). His alpha level is set at .01

Questions

1. What is H1 and H0?
2. What is DV and IV?
3. What is df?
4. What value should you look at in SPSS output to decide whether to accept or reject H0?

Answers

1. H1: Extroversion is positively related to the perception of others' agreement.; H0: There is no relationship between extroversion and the perception of agreement
2. DV: Perception of agreement, IV: Extroversion
3. Df for correlation $N-1$: $314-1 = 313$
4. You need to look at two values, the Pearson's correlation (which is r), and the sig. value line (which is the p value)

More questions

Given a Pearson's r of $-.20$, and a sig. value of $.000$, answer the following questions:

1. Can he accept or reject H_0 ?
 - Why or why not?
2. What is the R^2 ?
 - What does this mean?

Answers

- The relationship is significant because the p value < alpha risk of .01 ($.000 < .01$)
- BUT, the r value is negative. This means that there is a negative relationship between extroversion and perception of agreement, which does not support H1
 - Therefore, you must reject both the null hypothesis and your research hypothesis
 - You have support for a significant negative correlation, but not a significant positive correlation
- $R^2 = .04$
 - This means that 4% of the variance in perception of agreement is explained by extroversion

ANOVA Example

- A researcher is interested in the amount of embarrassment felt a person feels when a romantic partner uses self-defeating humor. The researcher sets up an experiment where the same story is told by a romantic partner using more self-defeating humor, less self-defeating humor, or no humor. The researcher believes that more humor use by a romantic partner is more embarrassing. The experiment is given to 200 participants.

Questions

- What is H1 and H0?
- What is DV and IV?
- How many groups?
 - So what is the within groups df?
 - Between groups df?

Answers

1. H1: More self-defeating humor by a romantic partner is more embarrassing, H0: There is no relationship between self-defeating humor and embarrassment.
2. DV: Embarrassment, IV: Self-defeating humor condition (experimental, comparison, control)
3. Within groups $df = N - \text{number of groups}$
(200-3 = 197)
 - Between group df is the number of groups minus 1
(3-1 = 2)

Post Hoc

- If you determine that the F-test is significant by looking at the p-value, can you say that H_1 is supported?
- What will the post hoc test tell you?

Answers

- No, an F-test tells you that there is a difference between one of the pairs of means
- The post hoc test tells you where that difference is at

More review

- If you would like to do more review, I would strongly encourage you to look through your homework assignments. Both HMK7 and your Final paper will have SPSS output and examples to look at and learn from
- Good Luck on the Final!