PSYC 60 – Statistics
Spring 2012
Notes #5

One- versus Two-tailed Tests

Book: Section 11.3 – One-tailed and Two-tailed Tests

Testing for an increase (or decrease)

Example, assume alpha = _____
z = _____

Alternatively, if alpha = _____
z = _____

Testing for a difference

If _____ was in each tail, we would reject the null hypothesis _____ by chance alone.

For each tail, we divide alpha by ___ , so each tail has _____% and z = __

z = _____

We do NOT divide or multiple _____ by _____

Example 5A: You found a mystery drug in the back seat of a cab and want to test its effect on IQ. You administer it to 4 friends and find their mean IQ is now 83. The population mean IQ is 100 and standard deviation is 15. Assuming alpha = 0.05, did the drug affect IQ?

When to use 1- versus 2- tailed tests:

Problem says: "use a 2-tailed test"
"…test for an increase…"
"…test for a decrease…"
"…test for a difference…"
"…test for an effect…"
You are trying to achieve a certain value
You have an assumption about direction
You are testing if two things interact with one another

1-tailed is more sensitive

Additional sample means that will be significant in a _____-tailed test

When a 1-tailed test goes in the opposite direction

You predict that a study program increases test grades and plan on performing a 1-tailed test for an increase. After collecting your data, the sample mean z-score is -2.3. What do you do?

If you routinely plan 1-tailed tests with alpha = _____ but still report if they go in the opposite direction, you are effectively doing your statistics with alpha = _____

t-Distribution

Book: Chapter 13: t Test for One Sample

Youtube: http://www.youtube.com/watch?v=IzgaMRnSTRQ, Professor Parris (building a t-distribution: 19:40 – 33:27)

When we know σ

When we don't know σ

For t, we are using the sample to estimate the _____ and _____ of the population that the sample came from.

Comparison of distributions

- If our s value _____ σ, our t value will be more _____ than the z value

More t values in the _____

- The probability of t values is different than the probability of z values, so instead of a z-table we use a _____

Degrees of freedom (and the t-Distribution)

If n is large, our _____ are more like the _____

If n is large, our _____ are more like the _____

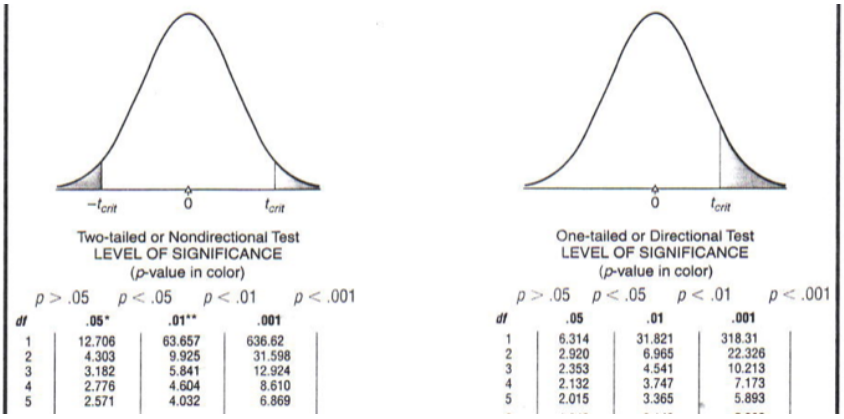
The t-distribution becomes more like the _____ as n increases

Therefore, the t-distribution is different for every value of _____, so the

probabilities of each _____ is different for every value of _____

Degrees of freedom (df) =

t Table (back of book, will be provided for exams)



Two-tailed or Nondirectional Test
LEVEL OF SIGNIFICANCE
(*p*-value in color)

	$p > .05$	$p < .05$	$p < .01$	$p < .001$
df	.05*	.01**	.001	
1	12.706	63.657	636.62	
2	4.303	9.925	31.598	
3	3.182	5.841	12.924	
4	2.776	4.604	8.610	
5	2.571	4.032	6.869	

One-tailed or Directional Test
LEVEL OF SIGNIFICANCE
(*p*-value in color)

	$p > .05$	$p < .05$	$p < .01$	$p < .001$
df	.05	.01	.001	
1	6.314	31.821	318.31	
2	2.920	6.965	22.326	
3	2.353	4.541	10.213	
4	2.132	3.747	7.173	
5	2.015	3.365	5.893	

Example 5B: μ = 20, alpha = .05. Is the following sample statistically different?

22
24
29

Confidence Interval

Book Chapter 12: Estimation (Confidence Intervals)

Terms:

Probability –

Confidence –

Hypothesis Tests

Confidence Interval

How it works:

In DSM, _____ of sample means will be within _____ of the population mean

For any given sample mean, you are _____ likely to reach the population mean if you go above or below by _____

If you know _____, you can be _____ confident that your sample is one for which μ is within _____

You can be _____ confident within _____

You can be _____ confident within _____

If we don't know _____, we can use _____

Confidence Interval –

Margin of Error -

Example: A water treatment plant wants to estimate the levels of a contaminant in the water as measured in parts per million (ppm). 10 water samples reveal a sample mean of 7.2 ppm with $s = 0.5$. What is the 95% confidence interval for the true contaminant level?

Outcomes & Errors
Book: Section 11.6 – 11.9

Reality:	Is there an effect?	
Our test:	Is stag sig?	Is stat sig?
Good/bad:		
Label:		
Error:		
Reason:		
Probability of this outcome		

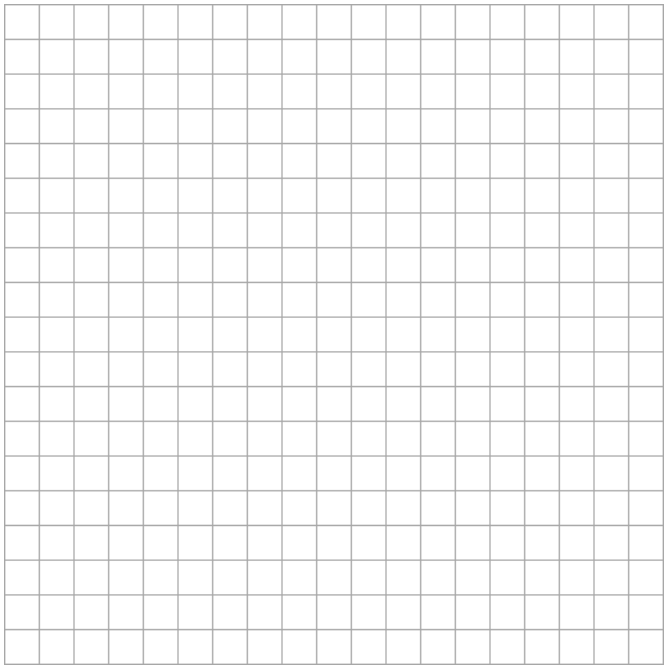
Power

Book: Section 11.11 – Power Curves (book is not as in-depth as course goes)

The ability of our test to detect an effect.

The "power" (or sensitivity) of an x-ray machine, metal detector, antenna, etc

When calculating power, we always assume _____



% of sample means from the alternative population (% of alt. DSM) that will beat our criteria (be among the top 5% of means that occur by chance)

Challenge: Assuming there is an effect, how do we quantify our chance of finding

_____ and deciding that _____

Assumption: We have to make a guess about the _____ and _____ of the effect. Might be based on:

Use: Decide if an experiment is worth doing. If power is low, we can:

Example 5C: Kaplan wants to decide whether to study if their course increases IQ. Assume the IQ population has a mean of 100 and SD of 15. What is the power for finding a 10 IQ pt increase for a sample size of 10. Assume alpha = 0.05.