Homework #6: t-scores - Key

These questions accompany **Lecture Video 5.1, *One Sample T-tests***.

slides 1-6.

1. Whereas the z-formula utilizes the symbol ___ σ_{xbar} ___ in the denominator, the t-test utilizes the symbol _ s_{xbar} __.
2. With a t-test, instead of knowing standard error as a population parameter, we must __estimate__ it.
3. In both the z and t formulas the top portion is unchanged: _ $x_{bar} - \mu$ ______ (write out the symbols)
4. To calculate standard error of the mean as an estimate, we divide _s_____ [symbol] by _sqrt n__[symbol].

slides 7 & 8

5. Compared to a z-distribution, a t-distribution is _shorter__ in the middle and __fatter__ at the tails.
6. The __t_____ (z or t) distribution shows more error.
7. As the size of the sample increases, t-critical gets _smaller_ and approaches the shape of the _z____distribution.
8. Using the table in the back of the book, assume α = .05, and then determine the value of t-critical for the following sample sizes ..... 4: __3.1824___, 7: __2.4469__, 20: _2.0930_ and 120: _1.9801__.

slides 9 & 10

Car Speed Problem by hand: *Are cars traveling slower/faster than 55 mph?*

9. What was the **observed difference** between the sample mean and the population mean? __3.889_______
10. What was the **expected difference** based just on standard error ? __2.606_____________
11. Would the obtained t-value been large enough for rejection if you were doing a **z-test**? _no_____
12. When doing a z- or t-test, hypothesis testing step #1 states you are comparing __xbar___ and _ μ _______.

Slides 13-18

Example #3: Critical Thinking Test Problem: *Do college graduates score lower/higher than 45 on the test?*

13. What was the **observed difference** between the sample mean and the population mean? __1.6667______
14. What was the **expected difference** based just on standard error? __3.5355_______
15. Would the obtained t-value have been large enough for rejection if you were doing **a z-test**? _no_____
16. What key value do we determine in third step of hypothesis testing? __tcritical___________

Slides 22-23

Car Speed Problem on SPSS: *Are cars traveling slower/faster than 55 mph?*

17. What would t-obtained equal if the cars in the sample had been going **54 mph** and standard error had been equal to **3**? __-.3333______ Could you have rejected the null then? __no__(t_{crit} = 2.306)
18. What would t-obtained equal if the cars in the sample had been going **49 mph** and standard **deviation** had been equal to **3**? __-6________ Could you have rejected the null then? _yes_(t_{crit} = 2.306)
19. Write out the t formula with the original values from the SPSS output and then calculate it, making sure you get the same answer.

$$t = \frac{\bar{x} - \mu}{\hat{s}_{\bar{x}}} = \frac{58.89 - 55}{2.606} = 1.492$$

20. What's the chance you'd get a t-value of this size just by chance? ___17.4%______
21. What was the sample mean with the first set of data? _58.89_______ With the second? _61.11______
22. An increase in the sample mean reflects an increase in (circle one) **treatment effect** or **sampling error**.

New Applied Problem

23. The tables to the right test whether people working at the factory 2 or more years average $10/hour. Label each of the SPSS table values with the correct symbol. ➔
24. What the null hypothesis? __Ho: μ = 10 _______
25. What's the difference observed? __-1.333_______
26. What's the difference expected? __0.527_______
27. Do your reject or retain the Ho? __Reject_________
28. What percent of time would you see a difference between the means this large just by chance? __3.5%__

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
		$\bar{x}$	s	$\hat{s}_{\bar{x}}$
pay	9	8.67	1.581	.527

One-Sample Test

	Test Value = 10 (μ)			
	t	df	Sig. (2-tailed)	Mean Difference
			p	$\bar{x} - \mu$
pay	-2.53	8	.035	-1.333