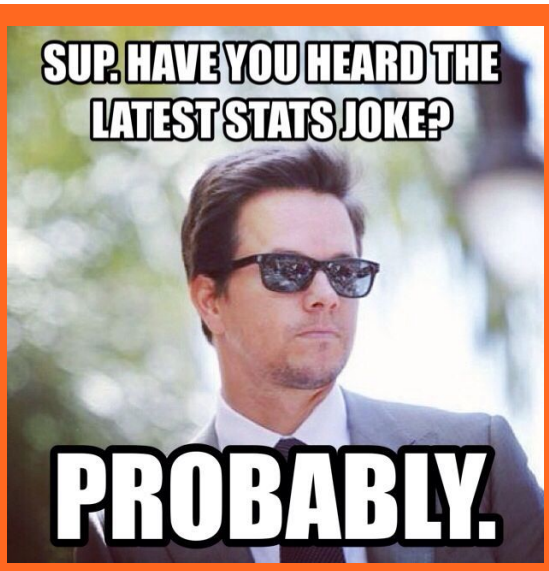
March 4, 2020

1) CALC

2) Warm Up

3) Normal Table



Statistical Reasoning Name: _____
Warm Up - Normal Table Review

1. The height of the students in Mr. Thornton's class has a mean of 64 inches and a standard deviation of 1.7 inches. Assuming these heights follow a normal distribution find the following:
   a. What percentage of students have a height **less than** 62 inches?

$z = \frac{62-64}{1.7}$

$z = -1.18$

$P = .1190 \rightarrow 11.90\%$

   b. What percentage of students have a height **greater than** 67 inches?

$z = \frac{67-64}{1.7}$

$z = 1.76$

$P = .9608$

$1 - .9608 = .0392$ 3.92%

   c. What percentage of students have a height **between** 63 and 66 inches?

Topic: Tests of Significance **Date:** _____

What am I learning today?

Main Ideas/ Questions	**Notes**
Population vs Sample S_x = sample st. dev.	**RECALL**: Population = The group of individuals that is being studied Sample = A subgroup (a part) of the population. **KEY SYMBOLS**: μ = pop. mean σ = pop. st. dev. $\bar{x}$ = sample mean.
Hypothesis Statements	**Null hypothesis** – A statement **about** the population or the 'true mean'. It tries to state what is 'commonly' accepted. It attempts to show that a variable is not different than its mean. It is assumed to be true UNTIL there is evidence to show that it should be rejected and to use the alternative hypothesis. ****Denoted H_0 ****The statement MUST include one of the following words: $\leq$ → less than/equal to $\geq$ → greater than/ " " $=$ → equal to. **Alternative hypothesis** – States the opposite of the null hypothesis. This is something that is not commonly accepted or claimed. The variable is different from its mean. ****Denoted H_A ****The statement MUST include one of the following words: $<$ → less than $>$ → greater than.
Hypothesis Statements	**How to write a hypothesis statement:** 1. Decide what is claimed 2. Decide what sample was taken 3. Write your null hypothesis about what they 'claimed' and write your alternative hypothesis based on the sample and how it relates to the claim.

Topic: Tests of Significance **Date:** _____

Main Ideas/ Questions

Examples

Notes

Example 1: The Spud Potato Chip company claims that their bags of chips contain 28.3 grams of chips. You decided to conduct an investigation and find that they mean weight of the chips in your sample is 25 grams.

Write your hypothesis statements **in words**:

H_0 : On avg., bags of potato chips have 28.3g of chips.

H_A : On avg, bags of potato chips have less than 28.3g of chips.

25<28.3

Write the hypothesis statement **in symbols**:

H_0 : $\mu = 28.3g$

H_A : $\mu < 28.3g$

P-value Test

$z = \frac{x - \bar{x}}{s_x}$

$z = \frac{\bar{x} - \mu}{\sigma}$

P-Value (1-tailed hypothesis tests) – The probability of obtaining a result either higher or "more extreme" (higher or lower) than what is actually observed.

How to calculate a p-value:

1) Compute the z-score
2) Use the normal table to find the probability
3) Compare to a significance level ($\propto$)

*always use $\alpha = .05$ unless given.

Test Results – MUST HAVE A SIGNIFCANCE LEVEL

Example: $\propto = 0.05$ (5 %)

**If the p-value is greater than 0.05 → "fail to reject" the null hypothesis

**If the p-value is less than 0.05 → reject the null hypothesis

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Examples: - State if the null hypothesis should be rejected given the p-value

1. $\propto = 0.05$; p = 0.04 — 5% 4% — p < α REJECT

2. $\propto = 0.05$; p = 0.051 — 5% 5.1% — p > α F.T.R.

3. $\propto = 0.01$; p = 0.02 — 1% 2% — p > α F.T.R.

4. $\propto = 0.08$; p = 0.05 — 8% 5% — p < α REJECT

Topic: Tests of Significance **Date:** _____

Main Ideas/ Questions

Hypothesis testing examples

Notes

Example 1:
Eric loves Snapchat. He claims that he sends 50 snaps during 1st block ("gotta keep those streaks"). Mrs. Brattebo saw that he sent 35 snaps this morning.

a. Write a hypothesis statement

H_0: On avg, Eric sends 50 snaps. ($\mu = 50$)

H_A: On avg, Eric sends less than 50 snaps. ($\mu < 50$)

b. Find the p-value.

① $z = \frac{35-50}{5}$

$z = -3.00$ → $p = .0013$

.13%

$\alpha = 0.05$

5%

$p < \alpha$ REJECT

REJECT: "We have enough evid...."

c. Do we have enough evidence to reject the null hypothesis? Use a significance level of $\alpha = 0.05$ and a standard deviation of 5 snaps.

$\alpha = .05$

$p = .0013$

$p < \alpha$

REJECT- We have enough evidence to show that.... on avg. Eric sends less than 50 snaps.

Example 2:
Amber loves chicken wings. She claims that she eats 8 wings (with a standard deviation of 2 wings) every time she goes out. Yesterday at lunch, Marie noticed Amber ate 12 wings.

F.T.R: "We do not have enough evidence..."

a. Write a hypothesis statement

H_0: on avg, Amber eats 8 wings. ($\mu = 8$)

H_A: on avg, Amber eats more than 8 wings. ($\mu > 8$)

b. Find the p-value.

① $z = \frac{12-8}{2}$

$z = 2.00$ → TBL = .9772

1 - .9772

= .0228

$p = .0228$

c. Do we have enough evidence to reject the null hypothesis? Use a significance level of $\alpha = 0.01$.

$\alpha = .01$

$p = .0228$

$p > \alpha$

F.T.R: We do not have enough evidence to show that...

H_0