CH 10 AP STATS PRACTICE TEST

SECTION II: FREE RESPONSE

T 10.1 ⓐ CONSTRUCT + INTERPRET a 95% CI

STEP 1 $\mu_1 = \mu_H$ = true mean hospital stay for hypothermic group
$\mu_2 = \mu_N$ = true mean hospital stay for Normal thermic group

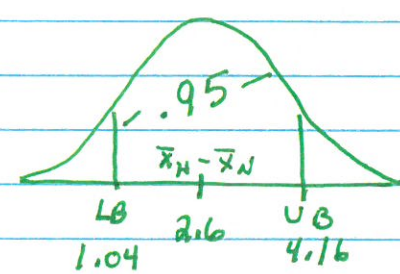
Notice: Normal > Thermo means

TEST: 2 sample $\underline{\underline{t}}$ interval for $\mu_H - \mu_N$

STEP 2 CONDITIONS
Random: / Independent: This is a randomized controlled experiment and since the groups were randomly assigned, they are independent
Normal: **Both** samples have than 30 observations.

STEP 3 STATISTICS

Group H: $\bar{x} = 14.7$ $s_x = 6.5$ $n = 96$
GROUP N: $\bar{x} = 12.1$ $s_x = 4.4$ $n = 104$



$\bar{X}_H - \bar{X}_N = 14.7 - 12.1$

technology 0: 2-SampleTInterval
state: df = 165.1 (technology)
interval (1.0375, 4.1625)

BY HAND $df = 96 - 1 = 95$

$$14.7 - 12.1 \pm 1.985\sqrt{\frac{(4.4)^2}{104} + \frac{(6.5)^2}{96}}$$

2.6 ± 1.57

(1.03, 4.17)

STEP 4 Conclusion:
We are 95% confident that the interval 1.04 to 4.16 days captures the true difference mean hospital stay between normal and hypothermic treatments.

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T 10.11a (cont) Conclusion interpretation:
This interval suggest that the mean hospital stay for patients receiving the hypo thermic treatment is between 1.04 and 4.16 days longer than patients receiving the normal thermic (using heating blankets) treatment

T 10.11 b

This interval does suggest keeping patients warm during surgery does affect the average length of hospital stays. Because the interval does NOT include 0 (which means Normal = Hypo).

T10.12 a) Carry out an appropriate test

STEP I:

p_1 = true proportion of cars that had the brake defect last year.
$x = 20$ $n = 100$

p_2 = true proportion of cars that had the brake defect this year.
$x = 50$ $n = 350$

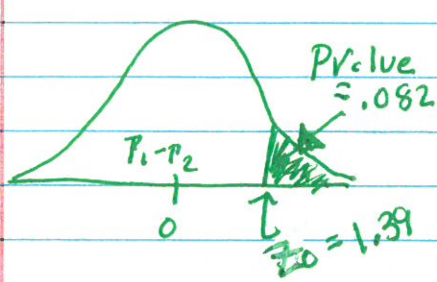
$H_0: p_1 = p_2$
$H_A: p_1 > p_2$

STEP II CONDITIONS TEST 2 Sample Z test for $p_1 - p_2$

Random - both samples were randomly selected
Independent - since sampling without replacement we check the 10% condition
① It's reasonable that there were more than $100(10) = 1{,}000$ cars last year;
② and $350(10) = 3{,}500$ cars this year.

Normal
last yr $\hat{p}_1 = 20/100 = .2$ $n\hat{p}_1 = 20 > 10$ $n\hat{q}_1 = 80 > 10$
this yr $\hat{p}_2 = 50/350 = .14$ $n\hat{p}_2 = 50 > 0$ $n\hat{q}_2 = 300 > 10$

STEP III STATISTICS $\boxed{\text{6: 2-PropZTest}}$



$\hat{p}_1 = .2$ $\hat{p}_2 = .14$

Must state $\hat{p}_c = \frac{20+50}{100+350} = \frac{70}{450} = .156$

$z_0 = 1.39$

pvalue $= P(z \geq 1.39) = .082$

T10.12a (cont)

STEP IV CONCLUSION

Since the pvalue (.082) is greater than $\alpha = .05$, We fail to reject H_0. We do <u>NOT</u> have sufficient evidence to conclude that the proportion of brake defects is less on cars of this years model compared to last year's model.

T10.12b

<u>TYPE I ERROR:</u> (reject H_0 when really true)

- IN THIS CASE THAT WOULD MEAN CONCLUDING THAT THERE ARE FEWER BRAKE DEFECTS ON THIS YEAR'S CAR MODEL WHEN IN FACT THERE ARE NOT FEWER CONSEQUENCE: THIS MIGHT RESULT IN MORE ACCIDENTS BECAUSE BECAUSE PEOPLE THINK THEIR BRAKES ARE SAFE.

<u>TYPE II ERROR:</u> (fail to reject H_0 when in fact it is false)

- IN THIS CASE THAT WOULD MEAN CONCLUDING THAT THERE ARE NO FEWER BRAKE DEFECTS THIS YEAR THAN LAST YEAR WHEN THE NUMBER OF BRAKE DEFECTS HAS ACTUALLY BEEN REDUCED. CONSEQUENCE: THIS MIGHT RESULT IN FEWER PEOPLE BUYING THIS PARTICULAR CAR.

T10.13

GIVEN:

μ_1 = true mean rents for all 1-bedroom apts
μ_2 = true mean rents for all 2-bedroom apts

$H_0: \mu_1 = \mu_2$
$H_a: \mu_1 < \mu_2$

NOTE: You do not need to enter any data for this Question (ERROR pvalue for 2tail test).

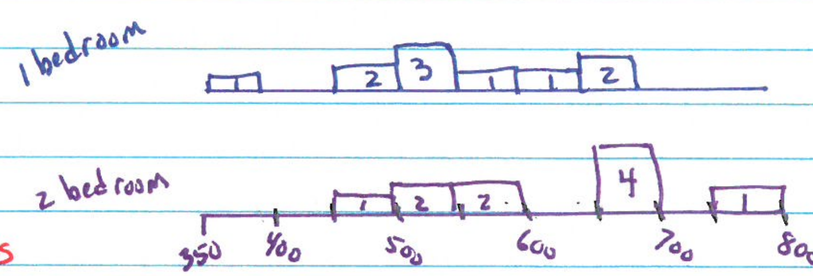
(a) TEST: 2 sample t test for $\mu_1 - \mu_2$

Conditions:

Random: She took 2 random samples (both $n = 10$)
Independent: It is reasonable there are more than 100 1-bedroom and 100 2-bedroom apts in her college area

Normal: Since the sample size is small you need to check graphs of the data.
(You could do a dot plot and not enter data)

HISTOGRAMS
The graphs do not show outliers OR strong skewness



T10.13b (cont)

(B) pvalue = .058

If the mean rent of the 2 types of apartments is really the same, we have a 5.8% chance of finding a sample, where the observed difference in mean rents is as large or larger than the one in this study.

(C) p value = .058 $\alpha = .05$

Since the pvalue (.058) is larger than $\alpha = .05$, we fail to reject H_0. Pat does NOT have enough evidence to conclude that the mean rent of a 2-bedroom apt is larger than the mean rent of a 1-bedroom apt.