Name: Solutions

Date: 5/1/2025

Math 130
Quiz 17

Some formulas you may need:

$$t=\frac{(\bar{x}_1-\bar{x}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}} \qquad t=\frac{\bar{d}-\mu_d}{\frac{s_d}{\sqrt{n}}} \qquad s=\sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}=\sqrt{\frac{\sum x^2-\frac{(\sum x)^2}{n}}{n-1}}$$

2-population μ problem / Independent Samples

1. (10 points) In order to see if there is a difference in math ability, 40 male and 32 female Math 130 students were randomly selected and asked what they got on their first Math 130 exam this Spring. The average score for the males was 72.8 points with a standard deviation of 8.2 points, and the average score for the females was 68.4 points with a standard deviation of 6.7 points. Use a 0.05 significance level to test the claim that Rio Hondo males taking Math 130 have an average exam 1 score different than Rio Hondo Females taking Math 130. Use the rejection region method.

Pop 1 = All Rio Hondo males taking math 130.
μ_1 = The average exam 1 score for all Rio Hondo males taking math 130.

Pop 2 = All Rio Hondo Females taking math 130.
μ_2 = The average exam 1 score for all Rio Hondo Females taking math 130.

Sample 1: $n_1 = 40$, $\bar{x}_1 = 72.8$, $s_1 = 8.2$

Sample 2: $n_2 = 32$, $\bar{x}_2 = 68.4$, $s_2 = 6.7$

Hypo Test

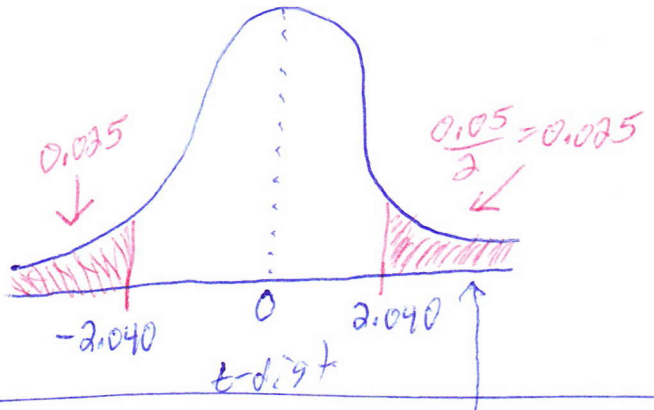
$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

Rejection Region

$\alpha = 0.05$

df = Smaller of n_1-1 and n_2-1
= Smaller of 40-1 and 32-1
= Smaller of 39 and 31
= 31



Test stat

$$t=\frac{(\bar{x}_1-\bar{x}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}}=\frac{(72.8-68.4)-(0)}{\sqrt{\frac{(8.2)^2}{40}+\frac{(6.7)^2}{32}}}=2.505582426$$

Conclusion Reject H_0!

Evidence suggests that Rio Hondo males taking Math 130 have an average exam 1 score different than Rio Hondo females taking Math 130.

2-population μ problem / Dependent samples

Extra Credit (10 points): In order to see if students gain weight in their first year in college, 8 random students were weighed once at the beginning of the fall semester and again at the end of the Spring semester (weights are in lbs). The data is below. Use a 0.10 significance level to test the claim that freshmen gain weight during their first year of college. Use the p-value method.

	Ed	Sam	Jill	Joe	Fred	Mike	Jack	Jen
Weight at beginning of the Fall	225	192	127	178	265	188	221	112
Weight at end of the Spring	237	188	122	184	280	188	219	114
Differences Spring weight − Fall weight	12	−4	−5	6	15	0	−2	2

Hyp. Test

$H_0: \mu_d = 0$

$H_1: \mu_d > 0$

μ_d = The average of all differences in weight (spring weight − fall weight)

Test stat

$n = 8$

$\bar{d} = \frac{12 + (-4) + \cdots + 2}{8} = 3$

$\Sigma x^2 = (12)^2 + (-4)^2 + \cdots + (2)^2 = 454$

$\Sigma x = 12 + (-4) + \cdots + 2 = 24$

$s = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}} = \sqrt{\frac{454 - \frac{(24)^2}{8}}{8-1}}$

$= 7.387247699$

$t = \frac{\bar{d} - \mu_d}{\frac{s}{\sqrt{n}}}$

$= \frac{3 - 0}{\frac{7.387247699}{\sqrt{8}}}$

$= 1.148639076$

p-value

$\alpha = 0.10$ $\quad df = n - 1 = 8 - 1 = 7$

$\rightarrow$ p-value $= P(t > 1.148639076)$

$= 0.1442$

Is p-value $< \alpha$?

$0.1442 < 0.10$?

No!

Conclusion

Do not reject H_0!

Not enough evidence to say that freshman gain weight during their first year of college.