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Problem Set – Lesson 11

Q1.

$\bar{X} = 3.8 \quad n_x = 18$

$\bar{y} = 2.1 \quad n_y = 25$

$S_p^2 = 0.13$

$H_0: \mu_x - \mu_y \leq 0$

$H_A: \mu_x - \mu_y > 0$

$\alpha = 0.05$

t - statistic =

t - critical =

- Retain H_0
- Reject H_0

Q2.

$\bar{X}_1 = 12 \quad n_1 = 52$

$\bar{x}_2 = 8 \quad n_2 = 57$

$S_p^2 = 5.1$

$H_0: \mu_1 - \mu_2 = 3$

$H_A: \mu_1 - \mu_2 \neq 3$

$\alpha = 0.05$

t - statistic =

t - critical = $\pm$

- Retain H_0
- Reject H_0

Q3.

$\bar{X}_1 = 35.8$ $n_1 = 207$ $SS_1 = 481$ $S_p^2 =$

$\bar{X}_2 = 31.6$ $n_2 = 220$ $SS_2 = 322$

$H_0: \mu_1 - \mu_2 = 0$

$H_A: \mu_1 - \mu_2 \neq 0$

$\alpha = 0.01$

t - statistic =

t - critical = ±

- Retain H_0
- Reject H_0

Q4.

Find the critical value of t for an independent samples t-test, one-tailed at $\alpha = 0.05$. $N = 25$.

N is the total number of data points across the two groups.

Q5.

p-value = 0.003

- Retain H_0
- Reject H_0

Consider this p-value in context of the test introduced on the previous question.

Q6.

p-value = 0.28

- Retain H_0
- Reject H_0

Consider this p-value in context of the test introduced in question 4 of the problem set.

Q7.

$\bar{X}_1 = 9$

$\bar{X}_2 = 8$

Standard error = 1.29

$t =$

Enter a positive t-statistic.

Q8.

True or False

	T	F
R^2 measures the distance between two means in terms of standard deviation.		
Statistical significance tells us that the sample statistics we have are most likely not due to chance.		
Cohen's d is a measure of effect size.		
R^2 measures the proportion of a difference in means that can be explained by the independent variable.		
An advantage of repeated-measures designs is they are less affected by carryover effects than between-subjects designs.		

Q9. For the data set below

X_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
2		
-3		
5		
4		
7		

Y_i	$Y_i - \bar{Y}$	$(Y_i - \bar{Y})^2$
10		
13		
15		
10		

Part 1

Compute each sum of squares.

SS_x =

SS_Y =

Part 2

Compute the pooled variance.

Part 3

Compute the standard error.

Part 4

Compute the t-statistic.

Part 5

Find the two-tailed t-critical values at $\alpha = 0.01$. $\pm$
Do we accept or reject the null?

- Retain H_0. There is no significant difference between the two populations.
- Reject H_0. There is a significant difference between the two populations.

Q10.

A researcher examined the effects of two different incentives to improve behavior in two groups of boys diagnosed with ADHD. The researcher randomly assigned 10 boys to each group. The boys earned points for every time they engaged in good behavior (e.g., raising a hand to ask a question, helping a fellow student, completing assigned work). Points could be exchanged for different incentives. For one group, the points could be exchanged for extra time at recess. For the other group, the points could be exchanged for prizes from the school gift shop (e.g., pencils, small toys). The researcher measured the number of good behaviors in a single 20-minute class period. Be sure you write down the values at each step; you will need them for later steps. Round to two decimal places in all steps and in your answers.

What is the independent variable?

- ☐ ADHD
- ☐ gender
- ☐ type of incentive
- ☐ the number of good behaviors in a single 20-minute class period

Q10. Part 2

What is the dependent variable?

- ☐ ADHD
- ☐ gender
- ☐ type of incentive
- ☐ the number of good behaviors in a single 20-minute class period

Q10. Part 3

What is the null hypothesis in everyday language?

- ☐ The points can be exchanged for prizes
- ☐ There will be a difference in the number of good behaviors between the two incentive conditions
- ☐ There will not be a difference in the number of good behaviors between the two incentive conditions

Q10. Part 4

What are the degrees of freedom?

Q10. Part 5

Find the t-critical values for a two-tailed test at $\alpha = 0.05$.

t-critical = ±

Q10. Part 6

The mean for the recess group was 10 and the mean for the prize group was 7. The standard error is 0.94. Compute the t-statistic.

t =

Q10. Part 7

- o Retain H_0
- o Reject H_0

Q10. Part 8

The pooled standard deviation was 2.33. Compute Cohen's d.

Q10. Part 9

____% of the variability in good behavior is due to the different incentive conditions.