Practice Problems

(Note that the alpha level is set at .05 in all problems.)

Read the following research scenario and answer questions 1 through 7.

An educational psychologist at Crawford College is interested in seeing if re-entry students (students who have not attended school for more than four years in order to work or raise a family) are more motivated to achieve higher grades than students who have not taken a break in their education. The psychologist knows that the population value for the grade point average of students at his college who have not interrupted their education is equal to 2.09. Data are listed below for a sample of GPAs for 10 re-entry students.

Reentry student	GPA
R. J.	3.7
B. N.	2.6
M. V.	3.1
T. D.	3.0
U. C.	3.1
P. T.	3.8
M. M.	2.6
N. B.	3.4
M. A.	3.0
G. P.	2.8

1. Compute the mean GPA for the re-entry students. $\overline{X}_{GPA} =$

2. Compute the standard deviation for the re-entry students. $S =$

3. Compute the estimate of the population standard deviation using the sample of re-entry students. $est.\sigma =$

4. Compute the estimate of the standard error of the mean. $est.\sigma_{\overline{X}} =$

5. Compute *t* and the degrees of freedom for this t.

6. Look up this *t* in Table T and state whether it is significant for a *one-tailed* test.

7. Given the results of the *t* test analysis, what conclusions can you make about the GPA of re-entry students?

Read the following research scenario and answer questions 8 through 14.

As a psychologist interested in eating behavior, you want to determine if scary movies cause people to eat more popcorn than musicals. You randomly assign 10 participants to a group that watches a scary movie (*Psycho*) and another 10 participants to a group that watches a musical (*The Sound of Music*). At the beginning of the movie, you give each participant a tub of 84 pieces of popcorn and tell each person not to share their popcorn with anyone. At the end of the movie, you measure the number of pieces of popcorn eaten by each participant. The data are shown below.

Scary X	Musical Y
45	32
67	38
69	33
56	49
73	44
56	60
63	48
84	36
49	23
56	39

8. Compute the mean pieces of popcorn for each of the two samples.

$$\overline{X} =$$

$$\overline{Y} =$$

9. Compute the standard deviation for each of the two samples.

$$S_X =$$

$$S_Y =$$

10. Compute the estimate of the standard error of the mean for each sample.

$$est.\sigma_{\overline{X}} =$$

$$est.\sigma_{\overline{Y}} =$$

11. Compute the estimate of the standard error of the difference.

$$est.\sigma_{Diff} =$$

12. Compute t and the degrees of freedom for this t.

13. Look up this *t* in Table T and determine if it is significant for a *two-tailed* test.

14. Based on the results of this *t* test, state the conclusions about the difference between the number of pieces of popcorn eaten by subjects viewing a scary movie versus a musical.

Use the following research scenario to answer questions 15 through 23.

An educational psychologist is interested in the ability of preschool children to solve math story problems. He wants to see if the method of presentation, either as verbal story problems or as visual story problems, makes a difference in preschoolers' abilities to solve the problems correctly. In an example of the verbal condition, a child is asked, "Two birds are sitting on a fence; two more birds fly down and join them. How many birds are on the fence altogether?" In an example of the nonverbal, visual equivalent of this problem, the experimenter presents the child with a picture of two birds on the fence with two birds in the process of landing on the fence and then asks the child, "How many birds are on the fence altogether?" In both conditions, the child responds orally. Shown below is the number of correct answers out of 10 problems for each child.

Child	Verbal	Nonverbal	*D*	*D²*
C. J.	3	6		
F. K.	5	8		
M. O.	7	9		
I. M.	4	8		
G. G.	2	4		
K. T.	1	1		
B. W.	4	3		
M. B.	2	8		

15. Compute the differences.

16. Compute the differences squared.

17. Compute the sum of the differences. $\sum D =$

18. Compute the sum of the differences squared. $\sum D^2 =$

19. Compute the mean of the differences. $\overline{D} =$

20. Compute the estimate of the standard error of the difference. $est.\sigma_{Diff} =$

21. Compute the *t* and the degrees of freedom for this t.

22. Look up this *t* in Table T and determine if it is significant for a two-tailed test.

23. What conclusions about the difference between a preschooler's ability to solve simple math problems presented either verbally or nonverbally can be made from these results?