Practice Problems

Use the following research scenario to answer questions 1 through 8.

Currently, psychiatrists, not psychologists, can prescribe drugs for the treatment of mental disorders such as schizophrenia and depression. Many clinical psychologists believe they should also have the legal right to prescribe drugs, when appropriate, for their patients. To see if medical doctors and psychologists are in agreement, a researcher asks 150 medical doctors and 150 clinical psychologists the question, "Should clinical psychologists have the right to prescribe drugs for patients with mental disorders?" The results of this survey follow.

	Should psychologists prescribe drugs? Yes	No	Row Total
Psychologists	A f_o =125 f_e =	B f_o = 25 f_e =	
Medical Doctors	C f_o =50 f_e =	D f_o =100 f_e =	
Column Total			Grand Total =

1. Compute the column totals for the survey data and enter them in the table.

2. Compute the row totals for the survey data and enter them in the table.

3. Compute the grand total for the survey data and enter it in the table.

4. Compute the frequency expected for each cell and enter it in the table.

5. Compute X^2 for the survey data.

   $X^2 =$

6. What are the degrees of freedom for this X^2? *df* =

7. Look up the critical value of X^2 for this *df* in Table X and state whether it is significant.

8. Given the significance of the computed X^2, what conclusions can you make about the data presented above?

Use the following research scenario to answer questions 9 through 15.

Parapsychology has been a controversial research area for many years. Many psychologists agree that there are no acceptable research data to support the notion of extrasensory abilities. Nevertheless, there are a surprising number of well-educated people who hold fast to their belief in extrasensory powers. A graduate student in psychology wants to know if a psychology background has much influence on how students feel about ESP. She surveys graduate students from three different graduate programs to see if they believe in extrasensory perception (ESP). The data collected are shown in the table below.

Believe in ESP?

Grad Students	Yes	No	Maybe	Row Total
Psych.	$f_o = 11$ $f_e =$	$f_o = 25$ $f_e =$	$f_o = 5$ $f_e =$	
Sciences	$f_o = 50$ $f_e =$	$f_o = 10$ $f_e =$	$f_o = 10$ $f_e =$	
Human.	$f_o = 60$ $f_e =$	$f_o = 5$ $f_e =$	$f_o = 15$ $f_e =$	
Column Total =				Grand Total =

9. Compute the column totals for the survey data and enter them in the table.

10. Compute the row totals for the survey data and enter them in the table.

11. Compute the grand total for the survey data and enter it in the table.

12. Compute the frequency expected for each cell and enter it in the table.

13. Compute X^2 for the data. $X^2 =$

14. What are the degrees of freedom for this X^2? *df* =

15. Look up the critical value of X^2 for the degrees of freedom in Table X and state whether it is significant.

Use the following research scenario to answer questions 16 through 23.

As a psychologist interested in eating behavior, you decide to determine if scary movies cause people to eat more popcorn than musicals. You randomly assign 10 subjects to watch a scary movie (*Psycho*) and another 9 subjects to watch a musical (*The Sound of Music*). At the beginning of the movie, you give each subject a tub of popcorn. At the end of the movie, you measure the number of pieces of popcorn eaten by each subject. Using the **Mann-Whitney U**, you analyze the data shown below.

Scary X_1	R_1	Musical X_2	R_2
45		32	
67		38	
69		33	
56		49	
73		44	
56		60	

63	48
84	36
49	23
56	

$\sum R_1 =$ ______ $\sum R_2 =$ ______

16. Rank the scores and write the ranks in the table above.

17. Compute the sum of the ranks for sample 1.

$\sum R_1 =$

18. Compute the sum of the ranks for sample 2.

$\sum R_2 =$

19. Compute U_1.

20. Compute U_2.

21. Which of the computed U's, U_1 or U_2, is U? $U =$

22. Look in Table U to find the critical value of your computed U for a two-tailed test. Is your computed U significant?

23. Given the significance of the U statistic you just computed, what are your conclusions about the popcorn-eating data?

Use the following research scenario to answer questions 24 through 30.

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 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 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. Use the **Wilcoxon *T*** to analyze the following data.

Child	Verbal	Nonverbal	*D*	+R	-R
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			

$\sum +R =$ ____ $\sum -R =$ ____

24. Compute the differences and enter them in the table above.

25. Rank the differences and place the ranks in the appropriate column in the table.

26. Sum the plus ranks.

$\sum +R =$

27. Sum the minus ranks. $\sum -R =$

28. Which of the sums, the sum of the plus ranks or the sum of the minus ranks, is *T*?

T =

29. What is the number of signed ranks? *n* =

30. Look up the critical value of *T* in Table W for a two-tailed test. Is the computed value of *T* significant?

Use the following research scenario to answer questions 31 through 36.

A group of psychologists wants to know if self-help audiotapes can improve a subject's memory. They randomly assign eight people to one of three conditions: audible, subliminal, and control. In the audible condition, participants listen to a tape that discusses a well-known mnemonic technique at a loudness level that is clearly audible. In the subliminal condition, subjects listen to a tape with the same message, but played at such a low volume that none of the participants can consciously hear the message. In the control condition, participants "listen," but the tape is blank and has no message. The following day, the participants return and are presented with a list of words. After a five-minute break, they take a test to see how many words they remember. The dependent variable in this experiment is the score received on the memory test. Conduct a **Kruskal-Wallis Test** to analyze the following data.

Type of Tape

Audible		Subliminal		Control	
X_1	R_1	X_2	R_2	X_3	R_3
55		32		30	
62		30		29	
49		28		26	
55		31		33	
61		33		28	
58		32		29	
55		36		33	
$\sum R_1 =$		$\sum R_2 =$		$\sum R_3 =$	

31. Combine the samples and rank all the scores; then enter those ranks in the table above.

32. Sum the ranks for samples 1, 2, and 3 and enter those values in the table above.

33. What are the following?

a) $n_1 =$

b) $n_2 =$

c) $n_3 =$

d) $N_T =$

34. Compute *H*.

35. Look up the critical value of *H* in Table X. What degree of freedom did you use? What is the critical value found in the table? Is the *H* you computed significant?

36. Given the significance of the *H* you computed, what conclusions could you draw from these data?