

Practice Problems

A psychologist studying maze learning in rats wants to determine if diet or the environment in which rats are raised affects the ability of rats to learn a maze. He randomly assigns rats to either a high protein diet or a low protein diet, and he raises the rats either alone in individual cages or in colonies with large numbers of other rats. Thus, one independent variable in this project is the type of diet, while the other independent variable is the type of environment in which the rats are raised. The dependent variable is the number of trials it takes each rat to learn a complex maze. Data collected are shown below.

	Low Protein Diet	High Protein Diet	Row Total
Raised alone	67 68 70 62 65 $\sum X =$ $\sum X^2 =$	43 32 38 32 37 $\sum X =$ $\sum X^2 =$	 $\sum X_{r_1} =$ $\sum X_{r_1}^2 =$
Raised in a colony	43 44 45 39 44 $\sum X =$ $\sum X^2 =$	28 24 27 25 29 $\sum X =$ $\sum X^2 =$	 $\sum X_{r_2} =$ $\sum X_{r_2}^2 =$
Col Total	$\sum X_{c_1} =$ $\sum X_{c_1}^2 =$	$\sum X_{c_2} =$ $\sum X_{c_2}^2 =$	$\sum \sum X =$ $\sum \sum X^2 =$

Complete the source table and answer the following questions.

Source Table – Maze Learning Data

Source	SS	df	MS	F	p
Columns					
Rows					
Interaction					
Within					
Total					

1. Compute the SS_{total} = .

2. Compute the SS_{wg} =

3. Compute the SS_r =

4. Compute the SS_c =

5. Compute the $SS_{r \times c}$ =

6. Compute degrees of freedom.

a. df_{total} =

b. df_{wg} =

c. df_r =

d. df_c =

e. $df_{r \times c}$ =

7. Compute the MS_{wg} =

8. Compute the $MS_r =$

9. Compute the $MS_c =$

10. Compute the $MS_{r \times c} =$

11. Compute the F ratio for the rows. $F_r =$

12. Compute the F ratio for the columns. $F_c =$

13. Compute the F ratio for the interaction. $F_{r \times c} =$

14. Compute the Critical Value of F for rows =

a. Is the computed F ratio for rows significant?

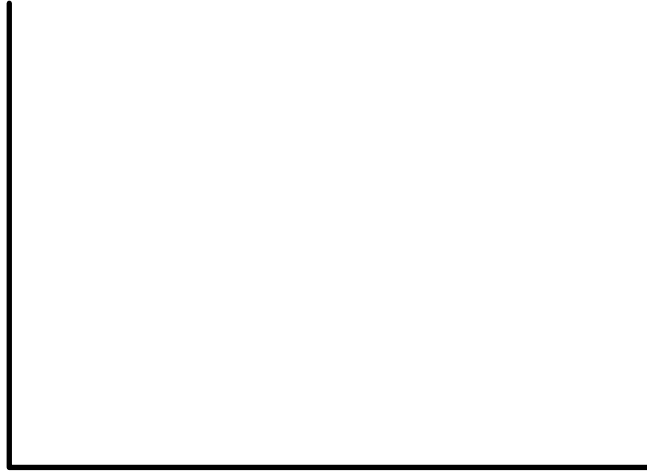
15. Compute the Critical Value of F for columns =

a. Is the computed F ratio for columns significant?

16. Compute the Critical Value of F for the interaction =

a. Is the computed F ratio for the interaction significant?

17. Graph the means for each cell in order to illustrate the interaction.



18. Given the significance of the F ratios you just computed, what conclusions can you make about the different independent variables in this experiment?