2-Way Hypothesis Testing Practice

1. A student noticed that her English teacher, Mrs. Jones, has one of the highest rates of dress coding people throughout the year. The student decided to look into whether the distribution of dress coding (leveled by severity A or B) is equal between genders. [Notes: Severity A dress code is receiving clothes to cover up, Severity B dress code is being sent home to change.] Determine whether there is an equal distribution between genders in terms of dress codes, when the level of significance is 10%.

	Severity A Dress Code	**Severity B Dress Code**
Male	34	4
Female	55	63

   a. What kind of 2-Way test is this?

   b. State the Hypotheses.

   c. Calculate the expected counts.

   d. What is the degrees of freedom?

   e. What is the test statistic?

   f. Calculate the p-value. What is the decision?

   g. Choose the correct interpretation.
      - ❑ At 10% level of significance, there is sufficient evidence to support that the variables are not homogeneous.

- ❑ At 10% level of significance, there is insufficient evidence to support that the variables are not homogeneous.

2. Jackson, at random, wondered whether there is a relationship between high school level (freshman, sophomore, junior, and senior) and pet species preference (cat, dog, other, or none). Complete the questions using the observed count table below.

	Cat	Dog	Other	None	Row Totals
Freshman	53	68	34	35	190
Sophomore	72	60	85	66	283
Junior	66	67	21	44	198
Senior	89	45	63	38	235
Column Totals	280	240	203	183	**Overall Total** 906

a. What kind of 2-Way test is this?

b. State the Hypotheses.

c. Calculate the Expected Counts in the table below.

	Cat	Dog	Other	None
Freshman				
Sophomore				
Junior				
Senior				

d. What is the Test Statistic?

e. What is the degrees of freedom?

f. Calculate the p-value. What is the decision?

g. Choose the correct interpretation.
   - ❑ At 5% level of significance, there is sufficient evidence to support that there is an association between high school level and preferred pet.
   - ❑ At 5% level of significance, there is insufficient evidence to support that there is an association between high school level and preferred pet.

3. Doctor Smith noticed that a certain gender tends to require a Tonsillectomy before the age of 10, while others require it later in life. Thus, using the data pulled from 60 previous Tonsillectomies, determine if there is a relationship between gender and when a Tonsillectomy, on average, is required. [*Note: the level of significance is 15%]

		10 & Under	Over 10	Row Totals
Male	**Observed**	21	A?	35
	Expected	B?	16.33	
Female	**Observed**	C?	14	D?
	Expected	12.5	E?	
Column Totals		30	F?	**Overall Total**
				60

A = B = C =

D = E = F =

a. What kind of 2-Way test is this?

b. State the Hypotheses.

c. What is the Test Statistic?

d. What is the degrees of freedom?

e. Calculate the p-value. What is the decision?

f. Choose the correct interpretation.

- ❑ At 15% level of significance, there is sufficient evidence to support that there is an association between gender and when a Tonsillectomy is required.
- ❑ At 15% level of significance, there is insufficient evidence to support that there is an association between gender and when a Tonsillectomy is required.

4. John, the director of a dog shelter, noticed that out of all the dogs present, certain sizes (large, medium, small) are usually preferred more than others. Similarly, he also noticed that the status of the prospective owner (single, married, divorced, widowed) seems to play a part. Determine whether the various dog breeds are equally distributed between the owner's status when the level of significance is 1%.

		Single	Married	Divorced	Widowed	Row Totals
Large Dogs	Observed	9	7	A?	8	34
	Expected	B?	8.5	8.19	8.5	
Medium Dogs	Observed	14	11	9	11	C?
	Expected	11.67	D?	10.83	11.25	

Small Dogs	Observed	E?	9	7	8	29
	Expected	7.52	F?	6.98	7.25	
Column Totals		28	27	G?	27	**Overall Total** H?

A = B = C = D =

E = F = G = H =

a. What kind of 2-Way test is this?

b. State the Hypotheses.

c. What is the Test Statistic?

d. What is the degrees of freedom?

e. Calculate the p-value. What is the decision?

f. Choose the correct interpretation.

- ❑ At 1% level of significance, there is sufficient evidence to support that the variables are not homogeneous.
- ❑ At 1% level of significance, there is insufficient evidence to support that the variables are not homogeneous.