

Test Prep Practice

1. 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 5%.

		Single	Married	Divorced	Widowed	Row Totals
Large Dogs	Observed	8	6	A?	9	32
	Expected	B?	8.37	8.07	8.07	
Medium Dogs	Observed	11	7	12	10	C?
	Expected	9.35	D?	10.09	10.09	
Small Dogs	Observed	E?	15	6	8	35
	Expected	8.18	F?	8.83	8.83	
Column Totals		25	28	G?	27	Overall Total
						H?

A =

B =

C =

D =

E =

F =

G =

H =

- a. What type of 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 5% level of significance, there is sufficient evidence to support that the variables are not homogeneous.
 - ☐ At 5% 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 gender and pet species preference (cat, dog, other, or none). Complete the questions using the observed count table below. [Note: the level of significance is 1%.]

	Cat	Dog	Other	None	Row Totals
Male	13	22	17	20	72
Female	19	16	12	14	61
Column Totals	32	38	29	34	Overall Total 133

- a. What type of test is this?
- b. State the Hypotheses.
- c. Calculate the Expected Counts in the table below.

	Cat	Dog	Other	None
Male				
Female				

- 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 1% level of significance, there is sufficient evidence to support that there is an association between gender and preferred pet.
 - ☐ At 1% level of significance, there is insufficient evidence to support that there is an association between gender and preferred pet.

3. Ella, a beauty CEO, is performing an experiment comparing the time it takes (in minutes) for different face mask formulas to dry to determine which face mask is best for quick use. Use the table below to answer the questions, keeping in mind that we are testing against a 10% significance level.

Formula A	Formula B	Formula C
3.72	2.15	1.35
4.12	3	2
3.98	2.59	2.31
4	2.68	1.98
3.54	3.02	2.12
3.88	2.55	1.87
4.21		1.64
3.79		

- a. What type of test is this?
- b. Identify the Factor, Levels, and response variables.
- c. State the Hypotheses.
- d. Fill in the ANOVA table.

	SS	Df	MS	TS	p-value
Factor (Variable)	A?	2	7.73	96.63	D?
Residual (Error)	1.46	B?	C?		
Total	16.92	20			

A =

B =

C =

D =

- e. What is the decision?
- f. Choose the appropriate interpretation.
 - ☐ At 10% level of significance, there is sufficient evidence to support that at least one of the treatment means differ.
 - ☐ At 10% level of significance, there is insufficient evidence to support that at least one of the treatment means differ.
- f. Would we move onto Post-Hoc? If yes, continue.
- g. Write the Post-Hoc Hypotheses.
- h. Analyze the R output below.

	diff	lwr.ci	upr.ci	pval
Formula B - Formula A	1.08	-1.455499	3.6154988	0.8149
Formula C - Formula A	-1.42	-3.955499	1.1154988	0.4616
Formula C - Formula B	-2.50	-4.814583	-0.1854169	0.0322 *

- i. Interpret the scenario.
4. In the previous years' track and field competition, out of the 55 students that participated from Coach Anderson's school, only 6 won gold, 9 won silver, 11 won bronze, and the remaining students got participation awards. Comparing the observed counts below, did Coach Anderson's school maintain it's previous years' achievements?

	Gold	Silver	Bronze	Participation
Observed	8	7	15	25
Expected				

- What type of test is this?
- State the Hypotheses.
- Calculate the Expected Counts.
- What is the degrees of freedom?
- What is the Test Statistic?
- 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 the distribution proportions are not correct.
- ☐ At 5% level of significance, there is insufficient evidence to support that the distribution proportions are not correct.

5. 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 73 previous Tonsillectomies, determine if there is a relationship between gender and when a Tonsillectomy, on average, is required. [*Note: the level of significance is 10%]

		10 & Under	Over 10	Row Totals
Male	Observed	19	A?	34
	Expected	B?	14.9	
Female	Observed	C?	17	D?
	Expected	21.9	E?	
Column Totals		41	F?	Overall Total
				73

A =

B =

C =

D =

E =

F =

a. What type of 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 10% level of significance, there is sufficient evidence to support that there is an association between gender and when a Tonsillectomy is required.
 - ☐ At 10% level of significance, there is insufficient evidence to support that there is an association between gender and when a Tonsillectomy is required.

6. Steven, a pharmacist, is trying to determine which ADHD medication is most effective out of the 4 most common types. To do so, the pharmacist asks 14 people for each medication how effective they would rate it. Use the statistics below to answer the questions, keeping in mind that we are testing against a 1% significance level.

Medication	Mean Score	Standard Deviation	Sample Size
#1	5.86	1.76	14
#2	3.29	3.21	14
#3	4.33	2.23	14
#4	3.72	1.43	14

- a. What type of test is this?
- b. Identify the Factor, Levels, and response variables.
- c. State the ANOVA Hypotheses.
- d. Fill in the ANOVA table.

	SS	Df	MS	TS	p-value
Factor (Variable)					
Residual (Error)					

- e. What is the decision?
- f. Choose the appropriate interpretation.
- ☐ At 1% level of significance, there is sufficient evidence to support that at least one of the treatment means differ.
 - ☐ At 1% level of significance, there is insufficient evidence to support that at least one of the treatment means differ.
- g. Would we move onto Post-Hoc? If yes, continue.
- h. Write the Post-Hoc Hypotheses.
- i. Analyze the R output below.

		diff	lwr	upr	p adj
2	-1	0.36250000	0.12528287	0.59971713	0.0010358
3	-1	0.07833333	-0.15888380	0.31555047	0.8143113
4	-1	0.22000000	-0.01721713	0.45721713	0.0778376
3	-2	-0.28416667	-0.52138380	-0.04694953	0.0131752
4	-2	-0.14250000	-0.37971713	0.09471713	0.3869986
4	-3	0.14166667	-0.09555047	0.37888380	0.3921830

j. Interpret the scenario.

7. Sally wants to figure out which of the three highly recommended electric companies is the most recommended. To do so, she compares her survey ratings (shown below out of 90 people *for 3 months each*) to the company's claimed satisfactory percentages: company A is 70%, company B is 50%, and company C is 90%. Determine if her rates line up with the company's claims with a 5% level of significance.

	Company A	Company B	Company C
Observed	62	43	76
Expected			

- What type of test is this?
- State the Hypotheses.
- Calculate the Expected Counts.
- What is the degrees of freedom?
- What is the Test Statistic?

- 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 the distribution proportions are not correct.
 - ☐ At 5% level of significance, there is insufficient evidence to support that the distribution proportions are not correct.
8. 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	32	23
Female	47	25

- a. What type of 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.