

Session 16:

Additional Exercise

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1. Introduction

This assignment will help you to consolidate the concepts learnt in the session.

2. Problem Statement

Problem Statement 1: [50 marks]

Two-tailed test for difference between two population means

Is there evidence to conclude that the number of people travelling from Bangalore to Chennai is different from the number of people travelling from Bangalore to Hosur in a week, given the following:

Population 1: Bangalore to Chennai

$$n_1 = 1200$$

$$x_1 = 452$$

$$s_1 = 212$$

Population 2: Bangalore to Hosur

$$n_2 = 800$$

$$x_2 = 523$$

$$s_2 = 185$$

Problem Statement 2: [50 marks]

Is there evidence to conclude that the number of people preferring Duracell battery is different from the number of people preferring Energizer battery, given the following:

Population 1: Duracell

$$n_1 = 100$$

$$x_1 = 308$$

$$s_1 = 84$$

Population 2: Energizer

$$n_2 = 100$$

$$x_2 = 254$$

$$s_2 = 67$$

Problem Statement 3: [100 marks]**Pooled estimate of the population variance**

Does the data provide sufficient evidence to conclude that average percentage increase in the price of sugar differs when it is sold at two different prices?

Population 1: Price of sugar = Rs. 27.50

$$n_1 = 14$$

$$x_1 = 0.317\%$$

$$s_1 = 0.12\%$$

Population 2: Price of sugar = Rs. 20.00

$$n_2 = 9$$

$$x_2 = 0.21\%$$

$$s_2 = 0.11\%$$

Problem Statement 4: [100 marks]

The manufacturers of compact disk players want to test whether a small price reduction is enough to increase sales of their product. Is there evidence that the small price reduction is enough to increase sales of compact disk players?

Population 1: Before reduction

$$n_1 = 15$$

$$x_1 = \text{Rs. } 6598$$

$$s_1 = \text{Rs. } 844$$

Population 2: After reduction

$$n_2 = 12$$

$$x_2 = \text{RS. } 6870$$

$$s_2 = \text{Rs. } 669$$

Problem Statement 5: [100 marks]**Comparisons of two population proportions when the hypothesized difference is zero**

Carry out a two-tailed test of the equality of banks' share of the car loan market in 1980 and 1995.

Population 1: 1980

$$n_1 = 1000$$

$$x_1 = 53$$

$$\hat{p}_1 = 0.53$$

Population 2: 1985

$$n_2 = 100$$

$$x_2 = 43$$

$$\hat{p}_2 = 0.53$$

Problem Statement 6: [100 marks]

Carry out a one-tailed test to determine whether the population proportion of traveler's check buyers who buy at least \$2500 in checks when sweepstakes prizes are offered is at least 10% higher than the proportion of such buyers when no sweepstakes are on.

Population 1: With sweepstakes

$$n_1 = 300$$

$$x_1 = 120$$

$$\hat{p}_1 = 0.40$$

Population 2: No sweepstakes

$$n_2 = 700$$

$$x_2 = 140$$

$$\hat{p}_2 = 0.20$$

Problem Statement 7: [100 marks]

A die is thrown 132 times with the following results:

Number turned up: 1, 2, 3, 4, 5, 6

Frequency: 16, 20, 25, 14, 29, 28

Is the die unbiased? Consider the degrees of freedom as $n - 1$.

Problem Statement 8: [100 marks]

In a certain town, there are about one million eligible voters. A simple random sample of 10,000 eligible voters was chosen to study the relationship between gender and participation in the last election. The results are summarized in the following 2X2 (read two by two) contingency table:

	Men	Women
Voted	2792	3591
Not voted	1486	2131

We would want to check whether being a man or a woman (columns) is independent of having voted in the last election (rows). In other words, is “gender and voting independent”?

Problem Statement 9: [100 marks]

A sample of 100 voters are asked which of four candidates they would vote for in an election. The number supporting each candidate is given below:

Higgins	Reardon	White	Charlton
41	19	24	16

Do the data suggest that all candidates are equally popular? [Chi-Square = 14.96, with 3 df, $p < 0.05$].

Problem Statement 10: [100 marks]

Children of three ages are asked to indicate their preference for three photographs of adults. Do the data suggest that there is a significant relationship between age and photograph preference? What is wrong with this study? [Chi-Square = 29.6, with 4 df: $p < 0.05$].

###		Photograph		
		A	B	C
Age of child	5 – 6 years	18	22	20
	7 – 8 years	2	28	40
	9 – 10 years	20	10	40

Problem Statement 11: [100 marks]

A study of conformity using the Asch paradigm involved two conditions: one where one confederate supported the true judgement, and another where no confederate gave the correct response.

	Support	No support
Conform	18	40
Not conform	32	10

Is there a significant difference between the "support" and "no support" conditions in the frequency with which individuals are likely to conform? [Chi-Square = 19.87, with 1 df: $p < 0.05$].

Problem Statement 12: [100 marks]

We want to test whether short people differ with respect to their leadership qualities (Genghis Khan, Adolf Hitler and Napoleon were all stature-deprived, and how many midget MP's are there?) The following table shows the frequencies with which 43 short people and 52 tall people were categorized as "leaders", "followers" or as "unclassifiable". Is there a relationship between height and leadership qualities? [Chi-Square = 10.71, with 2 df: $p < 0.01$].

##	Height	
	Short	Tall
Leader	12	32
Follower	22	14
Unclassifiable	9	6

Problem Statement 13: [100 marks]

Each respondent in the Current Population Survey of March 1993 was classified as employed, unemployed, or outside the labor force. The results for men in California age 35-44 can be cross-tabulated by marital status, as follows:

	Married	Widowed, divorced or separated	Never married
Employed	679	103	114
Unemployed	63	10	20
Not in labor force	42	18	25

Men of different marital status seem to have different distributions of labor force status. Or is this just chance variation? (you may assume the table results from a simple random sample.)

Note: Solution submitted via github must contain all the detailed steps.

Marks will also depend on the usage of suitable notations and expressions.

3. Output N/A

