**Problem Statement 1:**

**In each of the following situations, state whether it is a correctly stated hypothesis testing problem and why**?

1. 0: = 25, 1: ≠ 25

Correct. Null hypothesis is 0: = 25 and alternative Hypothesis is 1: ≠ 25. Hypothesis specifics the Mue is either 25 or not 25.

1. 0: > 10, 1: = 10

Incorrect. Null Hypothesis has > 10 and alternative hypothesis is =10 but null hypothesis always claims for equality. hence null hypothesis should have >= 10.

1. 0: = 50, 1: ≠ 50

Correct. Correct. Null hypothesis is 0: = 50 and alternative Hypothesis is 1: ≠ 50. Hypothesis specifics the Mue is either 50 or not 50.

1. 0: = 0.1, 1: = 0.5

Incorrect. Values is both hypothesis are different.

1. 0: = 30, 1: > 30

Correct

Problem 2 :

The college bookstore tells prospective students that the average cost of its textbooks is

Rs. 52 with a standard deviation of Rs. 4.50. A group of smart statistics students thinks

that the average cost is higher. To test the bookstore’s claim against their alternative, the

students will select a random sample of size 100. Assume that the mean from them

random sample is Rs. 52.80. Perform a hypothesis test at the 5% level of significance

and state your decision.

**Solution:**

Null Hypothesis, Ho : Xbar = Rs. 52

Alternate Hypothesis, H1: Xbar > Rs. 52

Significance level is 5%. ,

Z Critical = – 1.96 and +1.96 for a two-tailed test at 5% level of significance.

Z\* = (52.80 – 52) / (4.5/sqrt(100)) = 0.8 / 0.45 = 1.78

Z\* = 1.78 falls in acceptance region, hence accept Null hypothesis. This means the average cost of the books is Rs.52

Problem Statement 3:

A certain chemical pollutant in the Genesee River has been constant for several years

with mean μ = 34 ppm (parts per million) and standard deviation σ = 8 ppm. A group of

factory representatives whose companies discharge liquids into the river is now claiming

that they have lowered the average with improved filtration devices. A group of

environmentalists will test to see if this is true at the 1% level of significance. Assume \

that their sample of size 50 gives a mean of 32.5 ppm. Perform a hypothesis test at the

1% level of significance and state your decision.

**Solution:**

Null Hypothesis, Ho : **μ = 34 ppm**

Alternate Hypothesis, H1: **μ < 34 ppm**

Significance level is 1%. ,

Z Critical = – 2.33 for a left tailed test at 1% level of significance.

Z\* = (32.5 – 34) / (8/sqrt(50)) = -1.5 / (8/7.07) = -1.5 / 1.13 = - 1.32

Z\* = - 1.32 falls in acceptance region, hence accept Null hypothesis. This means claims that lowered the average with improved filtration devices is not supported data

**Problem Statement 4:**

**Based on population figures and other general information on the U.S. population, suppose**

**it has been estimated that, on average, a family of four in the U.S. spends about $1135**

**annually on dental expenditures. Suppose further that a regional dental association wants**

**to test to determine if this figure is accurate for their area of country. To test this,**

**22 families of 4 are randomly selected from the population in that area of the country**

**and a log is kept of the family’s dental expenditure for one year. The resulting data are**

**given below. Assuming, that dental expenditure is normally distributed in the population,**

**use the data and an alpha of 0.5 to test the dental association’s hypothesis.**

**1008, 812, 1117, 1323, 1308, 1415, 831, 1021, 1287, 851, 930, 730, 699,**

**872, 913, 944, 954, 987, 1695, 995, 1003, 994**

**Solution:**

Null Hypothesis, Ho : **μ = 1135**

Alternate Hypothesis, H1: **μ not equal to 1135**

Significance level is 5%

‘s=240.37

‘n=22

Xbar = 1031.32

Z = (1031.32– **1135**) / (240.37/sqrt(22)) = -103.68 / 51.25 = -2.02

Critical value of Z is -1.96 , +1.96 for two-tailed test @ 5% & computed value is z= - 2.02 falls in acceptance region, accept null hypothesis . Hence average dental expense for population is accurate .

**Problem Statement 5:**

**In a report prepared by the Economic Research Department of a major bank the**

**Department manager maintains that the average annual family income on Metropolis is**

**$48,432. What do you conclude about the validity of the report if a random sample of**

**400 families shows and average income of $48,574 with a standard deviation of 2000?**

**Solution:**

Null Hypothesis, Ho : **μ = $48,432**

Alternate Hypothesis, H1: **μ > $48,432**

Significance level is 5%. ,

Z @ 0.05 is - \+ 1.645

Z\* = (**$48,574** – **$48,432**) / (2000/sqrt(400)) = 1.42

Z\* = 1.42 falls in acceptance region, hence accept Null hypothesis.

**Problem Statement 6:**

**Suppose that in past years the average price per square foot for warehouses in the**

**United States has been $32.28. A national real estate investor wants to determine**

**whether that figure has changed now. The investor hires a researcher who randomly**

**samples 19 warehouses that are for sale across the United States and finds that the**

**mean price per square foot is $31.67, with a standard deviation of $1.29. assume that**

**the prices of warehouse footage are normally distributed in population. If the researcher**

**uses a 5% level of significance, what statistical conclusion can be reached? What are**

**the hypotheses?**

**Solution:**

Null Hypothesis, Ho : **μ = $32.28**

Alternate Hypothesis, H1: **μ < $32.28**

Significance level is 5%. ,

Z @ 0.05 is 1.96

Z\* = (**$31.67**– **$32.28**) / (1.29/sqrt (19)) =(-0.61) / (1.29 / 4.35) = (-0.61) / 0.29 = -2.10

Z\* = -2.1 falls in rejection region, hence reject the Null hypothesis. Hence, the average price per square foot for warehouses has changed now.

**Problem Statement 7:**

**WAS NOT ABLE TO SEE THE NUMBERS IN THE TABLE**

**Problem Statement 8:**

**Find the t-score for a sample size of 16 taken from a population with mean 10 when the**

**sample mean is 12 and the sample standard deviation is 1.5.**

**Solution :**

**Problem Statement 9:**

**Find the t-score below which we can expect 99% of sample means will fall if samples**

**of size 16 are taken from a normally distributed population.**

Solution :

1-Alpha = 0.99

Alpha = 0.01

‘df=n-1=16-1=15

[t @ 0.99](mailto:t%20@%200.99) = - t @ 0.01 = -2.602

**Problem Statement 10:**

**If a random sample of size 25 drawn from a normal population gives a mean of 60 and**

**a standard deviation of 4, find the range of t-scores where we can expect to find the**

PROBLEM STATEMENT 10 IS INCOMPLETE