In each of the following situations, state whether it is a correctly stated hypothesis

testing problem and why?

1. 𝐻0: 𝜇 = 25, 𝐻1: 𝜇 ≠ 25

2. 𝐻0: 𝜎 > 10, 𝐻1: 𝜎 = 10

3. 𝐻0: 𝑥 = 50, 𝐻1: 𝑥 ≠ 50

4. 𝐻0: 𝑝 = 0.1, 𝐻1: 𝑝 = 0.5

5. 𝐻0: 𝑠 = 30, 𝐻1: 𝑠 > 30

Ans 1,3,5 As H0 is always a Null Hypothesis considering all the factors but H1 is always oppose of H0

**Problem Statement 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 their random sample is Rs. 52.80. Perform a hypothesis test at the

5% level of significance and state your decision.

Population\_Mean = 52

Population\_SD = 4.50

Sample\_size = 100

Sample\_mean = 52.80

Aplha = 0.05

We will apply Z test here as sample\_size is > 100 and Population\_SD is given

CI = 0.5-0.05 = 0.45

H0 = Population\_Mean = 52, H1 > 52

Z Test = 52.80 – 52/ 4.50/sqrt(100) = 6.23

Z(0.05) = 1.64

Hence we accept the Null Hypothesis as 6.23 > 1.64

**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.Which is less that Z score hence we will accept the Null Hypothesis.

CI = 0.5 – 0.01 =

H0: μ =34

H1: μ <34

Sample Size = 50

Sample Mean = 32.5 PPM

Alpha = 0.01, Z Critical = -2.32

Population SD = 8

We will perform a Z test as n> 30 and Population SD is given

32.5 – 34 /8 /sqrt(50) = -1.33

As Z score is > Z critical hence we accept the Null Hypothesis

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

Population Mean = 1135

N = 22

Alpha = 0.05

CI = 1-0.05 = 0.9750

CI range = [-1.96,1.96]

T=X¯−μ0/S/sqrt(n) = 1031.773 – 1135/ 239.7864/sqrt(22) =−2.0192.it does not fall in this range so we will reject the Null Hypothesis.

**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?**

Population\_Mean = 48,432.

n = 400

Sample Mean = 48574

Sample Standard Deviation = 2000

H0 = Population\_Mean = 48,432.

H1 != 48,432.

Z = 48574 - 48432 /2000/sqrt(400) = 1.42

Alpha = 0.05

CI = 1-0.05 = 0.9750

CI range = [-1.96,1.96]

**We accept the Null Hypothesis here**

**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?**

Population\_Mean = 32.28

n = 19

Sample\_Mean = 31.67

Sample\_SD = 1.29

Alpha = 0.05

H0 = Population\_Mean = 32.8

H1 = Population\_Mean != 32.8

ttest= ¯¯¯x−μs/√n

=31.67−32.281.29/√19=

−0.611.29/4.358898944

=−0.610.2959≈−2.062

Degree of Freedom = 18

Alpha = 0.05/2 = 0.025

−tcritical=−2.101andtcritical=2.101.

Decision:

ttest(−2.062)>−tcritical(−2.101)

Decision: Fail to reject H0.

**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.

n = 16

sample\_mean = 12

Population\_Mean = 10

sample\_sd = 1.5

12-10/1.5/sqrt(16) = 8/1.5 = 5.33

**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.

1. Alpha = 0.99

Aplha = 0.01

Df = 16-1 = 15

T(0.99) = T(-0.01) = -2.602