Solution of Problem 1:

In this problem,

Mean, µ = 260

Sample Standard Deviation, s = 10

Sample size , n = 100

Sample mean, x̅ = 230

Population standard deviation is unknown

H0 = Sample observation results are by chance

With the given data,

Test statistic = ( x̅ - µ ) / [ s / (sqrt of n)]

= (230 -260) / [ 10 / (sqrt of 100) ]

= -30

Degrees of Freedom = n – 1 = 100 – 1 = 99

Test Statistic is grater than the critical t value (considering α= 0.01) 2.625

Test Statistic is greater than critical value, we reject the null hypothesis . i.e. the test results are due to some non random cause and may be due to Indian road conditions.

Solution of Problem 2:

In this problem

Mean, µ = 2

Sample size , n = 50

Standard Deviation , σ = 0.7

Significance level , α = 0.05

Sample mean, x̅ is not given

Sample Standard Deviation, s is not given

We have to find out probability, P(run out of 110 lit water)

x̅ = 110 / 50 = 2.2

s = σ / sqrt of n = 0.7 / sqrt of 50 = 0.099

Z Score , z = ( x̅ - µ ) / s

z = (2.2 -2.0) / 0.099 = 2.02

from Z table probability ( X < 2.02) = 0.9783

hence, probability (run out of water ) = 1 – 0.9783 = 0.0217

2.17% is the probability that we run out of 110 lit water for 50 men on single day trip.

Null Hypothesis, H0 = We will not run out of 110 lit of water

As calculated above, test statistic, Z Score = 2.02

With significance level 0.05, Critical Z, Z 0.05 = 1.645

Calculated Z is greater that Critical Z, Hence we reject the null hypothesis.

Hence we can say that we will run out of water