

Tutorial 8

Qn 1

A colony of laboratory mice consists of several thousand mice. The average weight of all the mice is 32 grams with a standard deviation of 4 grams. A laboratory assistant was asked by a scientist to select 25 mice for an experiment. However, before performing the experiment the scientist decided to weigh the mice as an indicator of whether the assistant's selection constituted a random sample or whether it was made with some unconscious bias (perhaps the mice selected were the ones that were slowest in avoiding the assistant, which might indicate some inferiority about this group). If the sample mean of the 25 mice was 30.4, would this be significant evidence, at the 5% level of significance, against the hypothesis that the selection constituted a random sample?

Qn 2

A population distribution is known to have standard deviation 20. Determine the p-value of a test of the hypothesis that the population mean is equal to 50, if the average of a sample of 64 observations is

a) 52.5; b) 55.0 ; c) 57.5

Qn 3

A producer specifies that the mean lifetime of a certain type of battery is at least 240 hours. A sample of 18 such batteries yielded the following data:

237 242 232

242 248 230

244 243 254

262 234 220

225 236 232

218 228 240

Assuming that the life of the batteries is approximately normally distributed, do the data indicate that the specifications are not being met? (Use 5% level of significance)

Qn 4

A sample of 10 fish were caught at lake A and their PCB concentrations were measured using a certain technique. The resulting data in parts per million were

Lake A: 11.5, 10.8, 11.6, 9.4, 12.4, 11.4, 12.2, 11, 10.6, 10.8

In addition, a sample of 8 fish were caught at lake B and their levels of PCB were measured by a different technique than that used at lake A. The resultant data were

Lake B: 11.8, 12.6, 12.2, 12.5, 11.7, 12.1, 10.4, 12.6

If it is known that the measuring technique used at lake A has a variance of 0.09 whereas the one used at lake B has a variance of 0.16, could you reject (at the 5% level of significance) a claim that the two lakes are equally contaminated?

Qn 5

The viscosity of two different brands of car oil is measured and the following data resulted:

Brand 1 10.62 10.58 10.33 10.72 10.44 10.74

Brand 2 10.50 10.52 10.58 10.62 10.55 10.51 10.53

Test the hypothesis that the mean viscosity of the two brands is equal, assuming that the population have normal distributions with equal variances.