CMTH 642

Lab 2

Question 1

We want to test with 95 percent confidence interval whether the volume of a shipment of lumber is as usual (mu=39000 cubic feet). Use data<-rnorm(n, mean = , sd =) to generate 75 shipments with mean:36500 and sd:2000. Use set.seed(0) before rnorm to regenerate the same data if required. On the simulated data test Ho: mu = 39000

Hint: t.test(data, mu = 39000)

Question 2

The results obtained for an intelligence test in 10 subjects are:

65, 78, 88, 55, 48, 95, 66, 57, 79, 81

i- Calculate the sample mean and standard deviation

ii- Use a one-sample t-test to determine whether the average result of the population which received the same test is equal to 75 using a significance level of 0.05.

Question 3

A bottle filling machine is set to fill bottles with soft drink to a volume of 500 ml. The actual volume is known to follow a normal distribution. The manufacturer believes the machine is under-filling bottles. A sample of 20 bottles is taken and the volume of liquid inside is measured. The volumes were:

484.11, 459.49, 471.38, 512.01, 494.48, 528.63, 493.64, 485.03, 473.88, 501.59, 502.85, 538.08, 465.68, 495.03, 475.32, 529.41, 518.13, 464.32, 449.08, 489.27

i- Calculate the sample mean and standard deviation

ii- Use a one-sample t-test to determine whether the bottles are being consistently under filled using a significance level of 0.01.

Question 4

An outbreak of Salmonella-related illness was attributed to ice cream produced at a certain factory. Scientists measured the level of Salmonella in 9 randomly sampled batches of ice cream. The levels (in MPN/g) were:

0.593 0.142 0.329 0.691 0.231 0.7930.5190.392 0.418

Is there evidence that the mean level of Salmonella in the ice cream is greater than 0.3 MPN/g?

Question 5

Assuming that the data in mtcars follows the normal distribution, find the 95% confidence interval estimate of the difference between the mean gas mileage of manual and automatic transmissions. (Hint: two sample t-test)

Question 6

Consider the gain in weight of 19 female rats between 28 and 84 days after birth. 12 were fed on a high protein diet and 7 on a low protein diet. Using the following data, test the hypothesis that there is no difference in weight gain between female rats raised on a high-protein diet versus those raised on a low-protein diet. Use a significance level of $\alpha = 0.05$ and assume equal variances. ("Hint: var.equal=TRUE")

High protein: 134,146,104,119,124,161,107,83,113,129,97,12

Low protein: 70,118,101,85,107,132,94

Question 7

Load the "MASS" package. In the immer dataset of the "MASS" library: we have: Y1 Yield in 1931, Y2 Yield in 1932. Assuming that the data in immer follows the normal distribution, find the 95% confidence interval estimate of the difference between the mean barley yields between years 1931 and 1932 (Hint: paired t-test). Get "p.value" in a variable pvalue and "statistic" in a variable st. (Hint: ttest<-t.test(…,…,…) and then names(ttest))

Question 8

A professor takes a random sample of students enrolled in her course. She finds the following: in the sample, there are 25 freshmen, 32 sophomores, 18 juniors, and 20 seniors. Test the null hypothesis that freshman, sophomores, juniors, and seniors are equally represented among students signed up for this course.

Hint: chi-square test