Problem 1 (7 pt)

For the hypothesis test $H_0 : \mu = 10$ against $H_1 : \mu < 10$ with variance unknown and $n = 20$, let the value of the test statistic be $t_0 = 1.25$.

a. Use table V to approximate the P-value.

b. Use R to compute the P-value. Attach the code and output.

c. Does your answer in part b agree with your answer in part a? Why or why not?

P287 8-40 (Modified) (37 pt)

A machine produces metal rods used in an automobile suspension system. A random sample of 15 rods is selected, and the diameter is measured. The resulting data (in millimeters) are as follows: 8.24 8.21 8.23 8.25 8.26 8.23 8.20 8.26 8.19 8.23 8.20 8.28 8.24 8.25 8.24

a. Check the assumption of normality for rod diameter in the population using a normal probability plot. What is your conclusion and why? Attach the plot.

b. Calculate a 95% two-sided confidence interval for the mean rod diameter of all the metal rods produced by this machine.

c. Based on the data given, can you conclude that the mean rod diameter of all the metal rods produced by this machine is different from 8.25 mm at a significant level of 0.01? Use the 8-step P-value approach.

d. Use R to conduct the same test given in part c. The resulting output should include all important information that can be used for 3 testing approaches, the rejection region approach, the p-value approach and the confidence interval approach. Attach the code and output.

e. Can you use the confidence interval in part b to conduct the test in part c? Why or why not?

f. Based on the data given, can you conclude that the variance of rod diameter of all the metal rods produced by this machine is greater than 0.0002 mm at a significant level of 0.01? Use the 8-step rejection region approach.

g. Do you need any additional assumptions to justify your test in part f? Why or why not?

h. Use an appropriate table to approximate the P- value for the test in part f.

i. Use R to calculate the P-value for the test in part f. Attach the code and output.