ISyE 6739 – Group Activity 12

Names: Group Number:

A sales manager in Procter And Gamble believes that the demand for Tide in Decembers is more than 10K units and wants to convince the production manager to increase the production rate in December. The Production manager asks the analytics department to test this claim with 95% confidence. The analytics department collects a random sample of sales in 9 past Decembers since 2000 and computes the average as 10.5k. Based on the past experience the standard deviation of the demand for Tide is 1k.

Problem 1. $H_0 : \mu = \mu_0$, $H_1 : \mu > \mu_0$. Answer the following questions:

a.   What is Pr{we reject H_0 |H_0 is true}? Rewrite this using the test statistic. What is this probability?

b.   What is the power of a test.

c.   What is a confidence of a test? What is this probability?

d.   What is Pr{we accept H_0 |H_0 is false}? Rewrite this using the test statistic.

Problem 2. For the problem setting described above. Answer the following:

a.   Suppose the actual mean is 11 and the sample size is 9. Calculate the type II probability and power.

b.   Suppose the actual mean is 11 and the sample size is 16. Calculate the type II probability and power.

c.   Suppose the actual mean is 12 and the sample size is 9. Calculate the type II probability and power.

d.   Based on your answers to previous parts, state the relationship between the power (type II error) and the sample size as well as the magnitude of deviation from H0.

Problem 3. For the problem setting described above, Answer the following:

a)   Suppose the actual mean is 11. To achieve 90% power, what should be the sample size?

b)   Suppose the actual mean is 11 and the hypothesis test is two-sided. To achieve 90% power, what should be the sample size? Compare your answer with that in part a.