
Statistics: Assignment No. 3

Instructions:

Attempt all Exercises, all exercises carry equal marks.

Remember to state your answer and show your workings from Minitab.

This assignment is **10%** of your final grade.

Exercise 1

The "House of Blues" in Boston is planning its budget for next year. In estimating the security man-hours needed for concerts, the average length of concerts is required. Using a random sample of $n = 36$ previous concerts, the sample mean duration is $\bar{x} = 110$ minutes, while the population standard deviation is $\sigma = 20$ minutes.

- (a) What is the population, the sample, the unit and the variable measured?
- (b) Using Minitab, determine the 95% confidence interval for the true mean duration μ of concerts using the sample data.

Exercise 2

A random sample of $n = 20$ drill bits is used to put holes into a steel doorframe. The lifetime of a drill bit is measured as the number of holes drilled before the bit fails. The average lifetime of a drill bit is 12.68 holes with a known population standard deviation of 6.83 holes.

- (a) What is the population, the sample, the unit and the variable measured?
- (b) Using Minitab determine the 95% confidence interval for the true mean lifetime μ of drill bits using the sample data.

Exercise 3

A neighbor grows and sells cucumbers in the summer. She packages them in plastic storage bags and claims that the true mean weight of these bags is 1 pound.

To test her claim, you take a random sample of 64 of these cucumber-filled bags, weigh them,

and find the sample mean weight to be $\bar{x} = 1.03$ pounds. The population standard deviation is $\sigma = 0.08$ lbs.

(a) Using Minitab determine the 90% confidence interval for the true mean weight μ cucumber bags using the sample data.

(b) With 90% confidence, is the neighbor's claim true? Why or why not?

Exercise 4

A sample of 150 boxes of cereal was randomly selected from the production line and found to have a mean weight of 500g and a standard deviation of 20g. A week later a sample of 120 boxes was randomly selected and, this time, the mean weight was 505g with a standard deviation of 16g.

(a) Using Minitab, Construct a 95% confidence interval for the difference in the average weight between the two samples.

(a) With 95% confidence, would you conclude that the process has shifted or not? Explain your answer.

Exercise 5

A multinational corporation (MNC) has two manufacturing facilities—one in Limerick, the other in Texas. Both produce identical products and employ roughly the same number of employees. The Operations Director randomly selects 25 weeks from the previous year's production figures. During each of the weeks chosen, employees worked 5 full days and no overtime.

The production figures, in thousands, for each facility are as follows:

Limerick					Texas				
3.8	3.8	4.1	3.7	3.9	3.5	3.6	3.7	3.4	3.7
3.7	3.7	3.9	3.9	3.8	3.6	3.5	3.5	3.5	3.8
3.7	4.1	3.7	3.8	3.5	3.7	3.8	3.6	3.6	3.6
4.0	3.9	3.8	3.7	3.8	3.6	3.6	3.6	3.6	3.8
3.8	3.9	3.9	3.9	3.8	3.5	3.7	3.5	3.6	3.6

(a) With 95% confidence interval, calculate the difference in means between the two plants.

(b) Comment on your answer.