Exercise 1

A company claims that their machines produce screws with an average length of 5 cm. You suspect that this might not be accurate. To test this claim, you randomly select a sample of 30 screws produced by these machines and measure their lengths. The sample mean length is found to be 4.95 cm, and from past data, it is known that the population standard deviation is 0.2 cm.

Perform a hypothesis test to determine whether the average length of screws produced by these machines is different from the claimed 5 cm. Use a 5% significance level for the test.

Exercise2

A dietitian claims that a new diet plan reduces the average daily calorie intake of individuals to 2200 calories. You want to test if this claim is true. You select a sample of 40 individuals who followed this diet plan for a month. The sample shows an average daily calorie intake of 2250 calories with a standard deviation of 150 calories.

Perform a hypothesis test to determine whether the new diet plan actually reduces the average daily calorie intake to 2200 calories. Use a 0.05 significance level for the test.