The null hypothesis, in this case, is that the proportion of ball bearings with diameter values less than 2.20 cm is the same for both the existing and new manufacturing processes. This can be represented mathematically as H0: p1 - p2 = 0, where p1 is the proportion of ball bearings with diameter values less than 2.20 cm from the existing manufacturing process, and p2 is the proportion of ball bearings with diameter values less than 2.20 cm from the new process. The alternative hypothesis is that the proportion of ball bearings with diameter values less than 2.20 cm is not the same for the existing and new manufacturing processes, mathematically represented as H1: p1 - p2 ≠ 0. The level of significance for this hypothesis test is 0.05. The test statistic for this hypothesis test is -0.23, and the two-tailed P-value is 0.8218. Since the P-value is higher than the significance level, we will reject the null hypothesis. Therefore, there is not enough evidence to suggest that the proportion of ball bearings with diameter values less than 2.20 cm is different between the existing and new manufacturing processes.

Based on the results, we can conclude that the factory's claim that the number of ball bearings with diameter values less than 2.20 cm is the same in the existing and new manufacturing processes.

A diameters data frame of the first sample (showing only the first five observations)

Diameters:

0 2.49

1 1.61

2 3.03

3 2.38

4 2.05

A diameters data frame of the second sample (showing only the first five observations)

Diameters:

0 3.41

1 1.77

2 2.75

3 2.80

4 2.19

test-statistic = -0.23

two tailed p-value = 0.8218