Records show that the average farm size in a particular region has increased over the last 70 years. This trend might be explained, in part, by the inability of small farms to compete with the prices and costs of large-scale operations and to produce a level of income necessary to support the farmers' desired standard of living. An agribusiness researcher believes the average size of farms has continued to increase since 2007 from a mean of 471 hectares. To test this, a random sample of 23 farms was selected from official government sources and their sizes recorded. The sample yielded a mean farm size of 498.78 hectares and a standard deviation of 46.94 hectares. Test the hypothesis, using either the p-value approach or the classical approach at the 0.05 level of significance.

Solution:

Here we have

Sample size $=$ 23

Sample Mean $=$ 498.78

Population Standard Deviation $=$ 46.94

Null Hypothesis (Ho): $\mu = 471$ (the average net income for sole proprietor CPA's has not changed in the last 5 years)

Alternative Hypothesis (Ha): $\mu > 471$ (average size of farms has continued to increase since 2007 from a mean of 471 hectares)

Level of significance $=$ 0.05

Critical value at 5% with 22 degree of freedom $=$ 1.717

Test statistics is

$$t = \frac{Sample\ Mean - Population\ Mean}{SE}$$

$$t = \frac{498.78 - 471}{46.94\sqrt{23}} = 2.838265$$

We can see that the test statistics value is bigger than 1.717, so we will reject the null hypothesis and conclude that the average size of farms has continued to increase since 2007 from a mean of 471 hectares.