Answer on Question #82154 – Math – Statistics and Probability

Question

Samples of a car company's output is taken and 490 cars are made in a day with a known standard deviation of 16 cars. Spell out the null and alternative hypotheses that the average production of the car company is less than 475 cars. Evaluate the hypothesis (Accept or Reject) at the following significance levels: 0.001 and 0.1

Solution

The Null Hypothesis (H_0): the average production of the car company is more or equal than 475 cars ($\mu \geq 475$).

The Alternative Hypothesis (H_a): the average production of the car company is less than 475 cars ($\mu < 475$).

Now we should calculate the probability of obtaining a sample of 490 cars in assumption of Null Hypothesis (i.e. assuming $\mu \geq 475$). To do this, let's find standard score:

$$z = \frac{x - \mu}{\sigma} = \frac{490 - 475}{16} = 0.94$$

Since $\mu \geq 475$ so we should find the area under the "bell" of Normal Distribution Curve to the left from z=0.94. Using the Standard Normal Table, or Z-table, we obtain P≈0.83.

So, we should accept the Null Hypothesis at both significance levels, since both 0.001<0.83 and 0.1<0.83.