

Answer on Question #46754 – Math – Statistics and Probability

- (i) Each computer chip made in a certain plant will, independently, be defective with probability 0.25. If a sample of 1,000 chips is tested, what is the approximate probability that fewer than 200 chips will be defective?

Solution:

$$n=1000$$

$$p=0.25$$

$$q=1-p=0.75$$

$$P(x < 200) - ?$$

Finding the binomial standard deviation:

$$\sigma = \sqrt{np(1-p)} = \sqrt{1000 \cdot 0.25(1-0.25)} = \sqrt{187.5}$$

Standardize the values of x using the Z-score formula:

Also we to use $x = 199.75$ for the continuity correction.

$$z = \frac{x - np}{\sigma} = \frac{199.75 - 250}{\sqrt{187.5}} = \frac{-50.25}{13.693} = -3.67$$

Go to the Z-score chart to find the final answer:

$$P(x < 200) = P(z < -3.67) = 0.0001$$

Answer: 0.0001

- (ii) A manufacturer of computer terminals claims that its product will last at least for 500 hours without needing repairs. Soft-i-Tech is considering buying many computer terminals. But, it wants to ensure that the claim made by the manufacturer is reasonably true. Soft-i-Tech's quality control managers examine the records of the manufacturer and find that a sample of 100 terminals had the average time before first breakdown occurred was 48 hours with a sample standard deviation of 25 hours. Use this scenario that as you decrease α , say from 0.5 to 0.1 $\beta(49)$ increases. What is the conclusion from this?

Solution:

The conclusion is: each 100 terminals breakdown every 48 ± 25 hours.