Answer on Question #51453 – Math – Statistics and Probability

Scores made by employees on a manual dexterity test are normally distributed with a mean of 600 and a variance of 10 000.

a) What is proportion of employees taking the test score below 300 ?

b) An employee is about to take a test. What is the probability that the employee's score will be 850 or more?

c) What is proportion of employees score between 450 and 700?

d) Suppose that management decides to consider for promotion only those employees who make a score of 800 or more. If the company has 800 employees how many will be eligible to be considered for promotion?

Solution

We know

$$\mu = 600; \sigma^2 = 10000; \sigma = \sqrt{\sigma^2} = \sqrt{10000} = 100.$$

a)

$$P(X \le 300) = P\left(Z \le \frac{300 - 600}{100}\right) = P(Z \le -3).$$

From z-table:

$$P(Z \le -3) = 0.0013.$$

b)

$$P(X \ge 850) = P\left(Z \ge \frac{850 - 600}{100}\right) = P(Z \ge 2.5) = 1 - P(Z \le 2.5).$$

From z-table:

$$P(Z \le 2.5) = 0.9938.$$

So,

$$P(X \ge 850) = 1 - 0.9938 = 0.0062.$$

c)

$$P(450 \le X \le 700) = P\left(\frac{450 - 600}{100} \le Z \le \frac{700 - 600}{100}\right) = P(-1.5 \le Z \le 1)$$
$$= P(Z \le 1) - P(Z \le -1.5).$$

From z-table:

$$P(Z \le 1) = 0.8413;\ P(Z \le -1.5) = 0.0668.$$

So,

$$P(450 \le X \le 700) = 0.8413 - 0.0668 = 0.7745.$$

d) Let k be the number employees who make a score of 800 or more and $N = 800$ is the total number of employees.

$$P(X \geq 800) = P\left(Z \geq \frac{800 - 600}{100}\right) = P(Z \geq 2) = 1 - P(Z \leq 2).$$

From z-table:

$$P(Z \leq 2) = 0.9772.$$

So,

$$P(X \geq 800) = 1 - 0.9772 = 0.0228.$$

Thus,

$$k = NP(X \geq 800) = 800 \cdot 0.0228 \approx 18.$$

Answer: **a)** 0.0013 ; **b)** 0.0062 ; **c)** 0.7745 ; **d)** 18.