

Conditions

Given X is normally distributed with a mean of 500 and a standard deviation of 125, find the probability that X is greater than 520 ?

Solution

To find this probability we must first calculate the value of distribution function F, which has a following formula (for normal distribution):

$$F_x(520) = \frac{1}{2} \left[1 + \operatorname{erf} \left(\frac{x - \mu}{\sqrt{2\sigma^2}} \right) \right] = \frac{1}{2} \left[1 + \operatorname{erf} \left(\frac{520 - 500}{\sqrt{2 \cdot 125^2}} \right) \right] \approx 0,4436$$

$$P(x > 520) = 1 - F_x(520) \approx 1 - 0,4436 = 0,5564$$

Answer: 0,5564