Assignment 3
CBSE Class 11 Exe 16.3 ,16

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Outline

Question

If x is N(l000; 400) find (a) P{x<1024}, (b) P{x<1024 x>961}, and (c) P$\{31 < \sqrt{x} \leq 32\}$.

Solution

x is in Normal distribution N(μ,σ^2) will be use to represent the Gaussian p.d.f

$$F_x(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(y-\mu)^2/2\sigma^2} dy = G(\frac{x-\mu}{\sigma}) \tag{1}$$

$\mu = 1000$
$\sigma = 20$

Solution-part-a

(a)

$$
\begin{aligned}
P\left\{x < 1024\right\} &= G\left(\frac{1024 - 1000}{20}\right) \\
&= G(1.2) \\
&= 0.8849
\end{aligned}
$$

Solution-part-b & c

(b)

$$P\{x < 1024 | x > 961\} = \left(\frac{P\{961 < x < 1024\}}{P\{x > 961\}}\right)$$
$$= \left(\frac{G(1.2) - G(-1.95)}{1 - G(-1.95)}\right)$$
$$= 0.8819$$

(c)

$$P\left\{31 < \sqrt{x} \leq 32\right\} = P\{961 < x \leq 1024\} = 0.8593$$