

# AI1110

## Assignment 4

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# Outline

1 Question

2 Solution

# Question

If  $x$  is  $N(1000; 400)$  find (a)  $P\{x < 1024\}$ , (b)  $P\{x < 1024 \text{ and } x > 961\}$ , and (c)  $P\{31 < \sqrt{x} \leq 32\}$ .

# Solution

$x$  is in Normal distribution  $N(\mu, \sigma^2)$  will be use to represent the Gaussian p.d.f

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

$$\mu = 1000$$

$$\sigma = 20$$

# Solution-part-a

(a)

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

## Solution-part-b & c

(b)

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

(c)

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