

Student Information

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Answer 1

a)

$$f(x) = \begin{cases} \frac{1}{120} & 60 \leq x \leq 180 \\ 0 & x < 60 \text{ or } x > 180 \end{cases}$$

b)

- $E(x) = \mu = \frac{a+b}{2} = 120$
- $Var(x) = \sigma^2 = \frac{(b-a)^2}{12} = 1200$
- $Std(x) = \sigma = \sqrt{Var(x)} = 34.64$

c)

$$P\{90 \leq x \leq 120\} = \int_{90}^{120} \frac{dy}{120} = \frac{120}{120} - \frac{90}{120} = 0.25$$

d)

$$P\{x > 150 \mid x > 120\} = \frac{P\{x > 150\}}{P\{x > 120\}}$$

$$P\{x > 150\} = \int_{150}^{\infty} \frac{dy}{120} = \int_{150}^{180} \frac{dy}{120} = 0.25$$

$$P\{x > 120\} = \int_{120}^{\infty} \frac{dy}{120} = \int_{120}^{180} \frac{dy}{120} = 0.5$$

$$P\{x > 150 \mid x > 120\} = \frac{0.25}{0.5} = 0.5$$

Answer 2

a)

$$\mu = np = 10, \sigma = \sqrt{np(1-p)} = 3.13$$

b)

$P\{x < 8\} = P\{x < 7.5\}$ by continuity correction,

$$P\{x < 7.5\} = P\left\{\frac{x-10}{3.13} < \frac{7.5-10}{3.13}\right\} = \Phi(-0.7987) = 0.2122$$

c)

$P\{x > 15\} = P\{x > 15.5\} = 1 - P\{x < 15.5\}$ by continuity correction,

$$P\{x > 15\} = P\{x > 15.5\} = 1 - P\left\{\frac{x-10}{3.13} < \frac{15.5-10}{3.13}\right\} = 1 - \Phi(1.757) = 1 - 0.9606 = 0.0394$$

d)

$P\{7 \leq x \leq 14\} = P\{6.5 < x < 14.5\}$ by continuity correction,

$$P\{7 \leq x \leq 14\} = P\{6.5 < x < 14.5\} = P\left\{\frac{6.5-10}{3.13} < \frac{x-10}{3.13} < \frac{14.5-10}{3.13}\right\}$$

$$P\left\{\frac{6.5-10}{3.13} < \frac{x-10}{3.13} < \frac{14.5-10}{3.13}\right\} = \Phi(1.4377) - \Phi(-1.1182) = 0.9247 - 0.1317 = 0.793$$

Answer 3

a)

In this situation, probability of the event is independent of previous events.

Thus, $P\{x = 0\}$ with poisson parameter $\lambda = 1$ is 0.3679.

b)

Same as the previous question, probability will not be affected by the previous event. Thus, $P\{x = 0\} = 0.3679$