

1. (1a)  $P_n(10, 0.25)$

$$P(X > 45) = \int_{45}^{60} \frac{1}{20} dx = \frac{x}{20} \Big|_{45}^{60} = \frac{60}{20} - \frac{45}{20} = 0.25$$

$$X \sim \text{Bin}(10, 0.25)$$

$$P(X=4) = \binom{10}{4} (0.25)^4 (0.75)^6$$

$$\hookrightarrow 210 (0.0039) (0.1779) = 0.1460$$

$$\frac{10!}{6!4!}$$

$$\frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 210$$

$$P(X=4) = 0.1460$$

2. (2a)  $P(T \geq 4) = 1 - P(T < 4) = 1 - P(T \leq 4)$  ( $\lambda = 0.5$ )

$$\frac{4}{0.5} = 8 \quad T \sim \text{Exp}(4, 0.5) \quad \text{Mean} = 8$$

$$= 1 - [P(X=0) + P(X=1) + P(X=2) + P(X=3) + P(X=4)]$$

$$= 1 - \left( e^{-4} \frac{4^0}{0!} + e^{-4} \frac{4^1}{1!} + e^{-4} \frac{4^2}{2!} + e^{-4} \frac{4^3}{3!} + e^{-4} \frac{4^4}{4!} \right)$$

$$= 1 - (0.135 + 0.227 + 0.227 + 0.160 + 0.099)$$

$$= 1 - 0.857 = 0.143$$

$$\cancel{2021 + 32}$$

3. (3A)

$$1 - P(T \leq 4) = 1 - \int_0^4 \text{gamma pdf}$$

$$P(T \geq 4) = \frac{100}{4} \frac{0.5^4}{\Gamma(4)} \times 4^{-1} e^{-0.5x} dx$$

$$\boxed{\frac{0.0625}{6} \int_4^{\infty} 3x^{-0.5} dx}$$