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X = number of patients arriving for treatment at an E.R. per hour

$X \sim$ Poisson ($\lambda = 5$ per hour)

$$P(X = x) = \frac{\lambda^x e^{-\lambda}}{x!}$$

a) $P(X = 4) = \frac{5^4 e^{-5}}{4!} = $

b) $P(X \geq 4) = P(X = 4) + P(X = 5)$

$\qquad + P(X = 6) + \ldots$

or

$P(X \geq 4) = 1 - P(X \leq 3)$

$$= 1 - \{ P(X=0) + P(X=1)$$

$$+ P(X=2) + P(X=3)$$

$$= 1 - \left\{ \frac{5^0 e^{-5}}{0!} + \frac{5^1 e^{-5}}{1!} + \frac{5^2 e^{-5}}{2!} \right.$$

$$\left. + \frac{5^3 e^{-5}}{3!} \right\}$$

$$=$$

c) $\quad E(X) = \lambda$

$$= 5 \text{ per hour}$$

$60 \text{ mins} \longrightarrow 5 \text{ arrivals}$

$45 \text{ mins} \longrightarrow ? \text{ arrivals}$

So we are using the Poisson Process

$$> 45\,min = \frac{5(45)}{60} = 3.75$$

So if we were asked to find probability of 4 arrivals in 45 minute period

$$P(X = 4) = 4\frac{3.75}{e} \frac{-3.75}{4!}$$

$$=$$