Serie 3

Ex 1

a) $n = 20 \qquad p = \frac{1}{3} \qquad k = 2$

$$P(X=2) = \binom{n}{k} p^k (1-p)^{n-k}$$

$$= \binom{20}{2} \left(\frac{1}{3}\right)^2 \left(1-\frac{1}{3}\right)^{20-2}$$

$$= \frac{20 \cdot 19}{2} \cdot \frac{1}{3} \cdot \left(\frac{2}{3}\right)^{18}$$

$$= \frac{190}{9} \cdot \left(\frac{2}{3}\right)^{18} =$$

$1 - P(X=2)$

$1 - P(X=0) - P(X=1)$

b) Non

c) Nom

Ex 2

a) $\lambda = 2$

$$P(x=k) = \frac{\lambda^k}{k!} e^{-\lambda}, \quad k \in \mathbb{N}$$

$$P(x=0) = \frac{2^0}{0!} e^{-2} = e^{-2} = 0{,}1353$$

b) $\lambda = 2$

$$P(x=1) \cup P(x=2) \cup P(x=3)$$

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

$$P(x=1) = \frac{2}{1!} e^{-2} = 2e^{-2}$$

$$P(x=2) = \frac{2^2}{2!} \cdot e^{-2} = 2e^{-2}$$

$$P(x=3) = \frac{2^3}{3!} e^{-2} = \frac{8}{6} e^{-2} =$$

c) Après 5 min → pas de requêtes
2S min 1 req par min

$P(X=0) = \frac{5}{30} = \frac{1}{6}$

Je
proba que
le nombre
de requêtes
soit = à zéro

$$\frac{1}{6} = \frac{\lambda^0}{1!} e^{-\lambda}$$

$$\frac{1}{6} = e^{-\lambda} \qquad 1 = 6e^{-\lambda} \qquad \lambda = -\ln\left(\frac{1}{6}\right) = 1{,}79$$

Ex 3

$E(X) = \mu \qquad \mathrm{Var}(X) = \sigma^2$

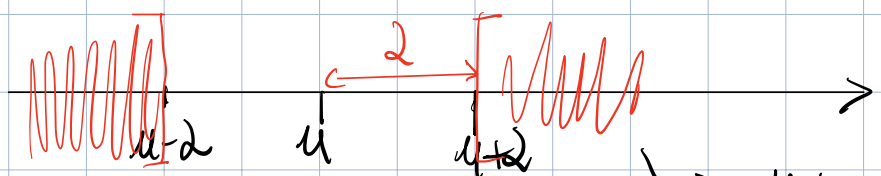
$$P(|X-\mu| \geq 2) \leq \frac{\sigma^2}{2^2}$$

$x \geq 0$ $\qquad$ $x < 0$

a) $x - y \geq 2$ $\qquad$ $-x - y \geq 2$

$x \geq 2 + y$ $\qquad$ $x \leq -2 + y$

$\rightarrow \quad y - 6\sigma < x < y + 6\sigma$

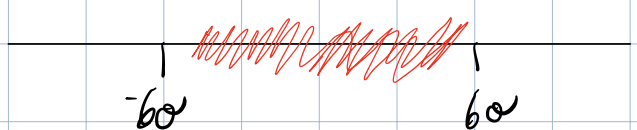


$\rightarrow$ après $\frac{x}{\sigma}$

$-6\sigma < X < 6\sigma$

$$P(|X| > -6\sigma) \leq \frac{\sigma^2}{36\sigma^2}$$

$$P(|X| < 6\sigma) \leq \frac{\sigma^2}{36\sigma^2}$$



$\geq 0,97 \Sigma$

b) $p = 0{,}5$ $\quad n = 1000$ partite $\quad$ fare $= 550$

$P(|x \geq 550|)$