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1

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & \text{si } x \geq 0 \\ 0 & \text{si } x < 0 \end{cases}$$

a) $$F(x) = \int_0^x f(x)\,dx = \int_0^x \lambda e^{-\lambda x} dx = \lambda \int_0^x e^{-\lambda x} dx = \lambda \int \frac{1}{e^{\lambda x}} = \lambda \left[-\frac{e^{-\lambda x}}{\lambda} \right]_0^x$$

$$F(x) = 1 - e^{-\lambda x}$$

b) Esperanza

$$E(x) = \int_0^\infty x \lambda e^{-\lambda x} dx = \left[-x e^{-\lambda x} \right]_0^\infty + \int_0^\infty e^{-\lambda x} dx$$

$$= 0 - 0 + \left[-\frac{1}{\lambda} e^{-\lambda x} \right]_0^\infty = 1/\lambda$$

Varianza:

$$Var[x] = E[x^2] - E[x]^2 = [\dots] = \frac{2}{\lambda^2} - \frac{1}{\lambda^2} = \frac{1}{\lambda^2}$$

c) Mediana

$$F(x) = 0,5 = 1 - e^{-\lambda x}$$

$$e^{-\lambda x} = 0,5 \Rightarrow -\lambda x \ln e = \ln 0,5$$

$$\Rightarrow x = -\frac{\ln(0,5)}{\lambda}$$

Para cuartiles / percentiles cualesquiera

$$x = -\frac{\ln(1-p)}{\lambda}$$

En R: summary(rexp(

d) plot(dexp) plot(qexp) densidad / distribución.

2) $P(X \geq \frac{1}{\lambda} + \frac{1}{\lambda} \mid X \geq \frac{1}{\lambda})$

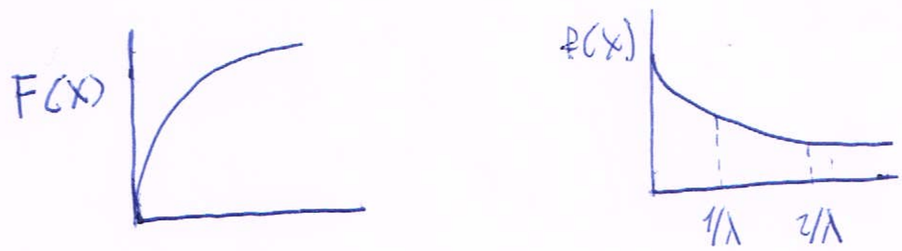
$$F\left(\frac{2}{\lambda}\right) = P\left(X \leq \frac{2}{\lambda}\right) = 1 - e^{-2}$$

$$P\left(X \geq \frac{2}{\lambda}\right) = 1 - F\left(\frac{2}{\lambda}\right) = e^{-2}$$

$$P\left(X \geq \frac{1}{\lambda}\right) = 1 - F\left(\frac{1}{\lambda}\right) = 1 - (1 - e^{-1}) = e^{-1}$$

$$P\left(X \geq \frac{2}{\lambda} \mid X \geq \frac{1}{\lambda}\right) = \frac{e^{-2}}{e^{-1}} = e^{-1} = P(X \geq 1/\lambda)$$

b)



3) $X \sim EXP(\lambda)$ $\begin{cases} \lambda e^{-\lambda x} & si\ x \geq 0 \\ 0 & si\ x < 0 \end{cases}$

~~$X \sim EXP(\lambda) =$~~

$X = (y/b)^c$

$$f(y) = \begin{cases} \lambda e^{-\lambda (y/b)^c} & si\ (y/b)^c \geq 0 \\ 0 & en\ otro\ caso \end{cases}$$

4) Sabiendo que $E(x) = \int x f(x)\, dx$ Entonces al aplicar la funcion 'h' a 'x', la esperanza de y es:

$$E(y) = E(h(x)) = \int h(x) f(x)\, dx$$

5) Si el numero de eventos/ocurrencias sigue una distrib. poisson entonces el tiempo hasta el siguiente evento sigue una distrib. exponencia