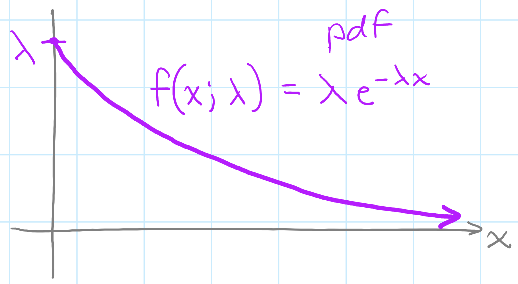
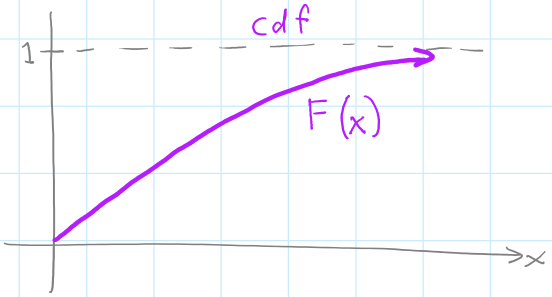
EXPONENTIAL DISTRIBUTION

The times between events in a Poisson process are exponentially distributed.

- pdf: $f(x;\lambda) = \begin{cases} \lambda e^{-\lambda x} & x>0 \\ 0 & \text{otherwise.} \end{cases}$



- cdf: $F(x) = \begin{cases} 1-e^{-\lambda x} & \text{for } x>0 \\ 0 & \text{otherwise.} \end{cases}$



- mean $E(X) = \frac{1}{\lambda}$

- variance: $Var(X) = \frac{1}{\lambda^2}$

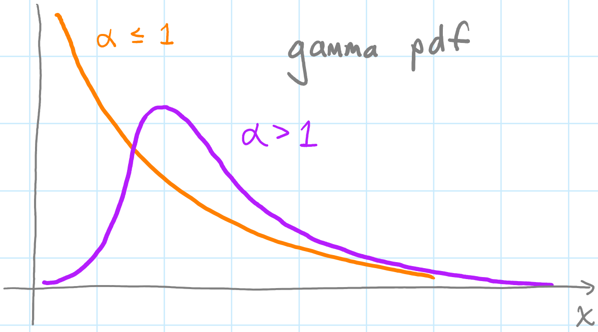
GAMMA DISTRIBUTION

$X \sim \text{Gamma}(\alpha,\beta)$ has pdf $f(x;\alpha,\beta) = \begin{cases} \frac{1}{\beta^\alpha \Gamma(\alpha)} x^{\alpha-1} e^{-x/\beta} & \text{if } x>0 \\ 0 & \text{if } x \le 0 \end{cases}$

mean: $E(X) = \alpha\beta$

variance: $Var(X) = \alpha\beta^2$

mgf: $M_X(t) = \frac{1}{(1-\beta t)^\alpha}, \quad t < \frac{1}{\beta}$



If $\alpha = n$, a pos. integer, then Gamma$(\alpha = n, \beta)$ is a sum of n independent Exp$\left(\lambda = \frac{1}{\beta}\right)$ random variables.