

Ω : STATE SPACE
 \mathcal{F} : EVENT SPACE
 (SIGMA-ALGEBRA ON Ω)

(Ω, \mathcal{F})
 MEASURABLE SPACE

P : PROBABILITY

(Ω, \mathcal{F}, P)
 PROBABILITY SPACE

X : RANDOM VARIABLE

CDF

$F(x) = P(X \leq x)$ $x \in [a, b]$, with $a, b \in \mathbb{R} \cup \{-\infty, +\infty\}$
 SUPPORT

QUANTILE FUNCTION

$Q(p) = F^{-1}(p) = \min\{x \in [a, b] : p \leq F(x)\}$

SURVIVAL FUNCTION

$S(x) = 1 - F(x) = P(X > x)$

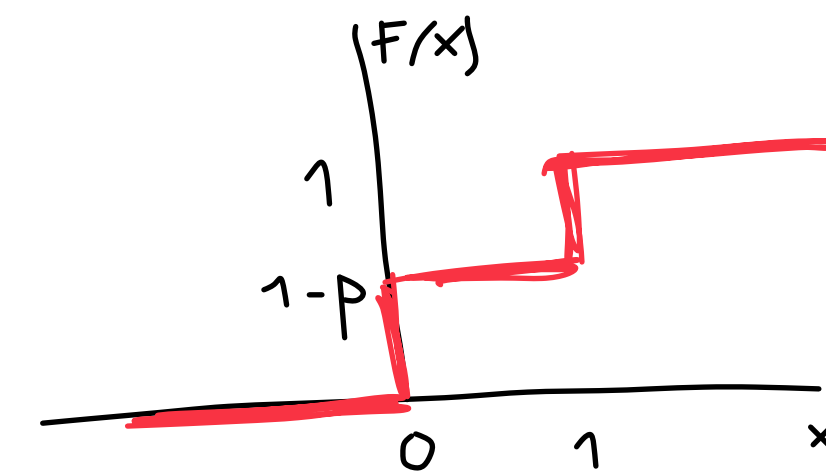
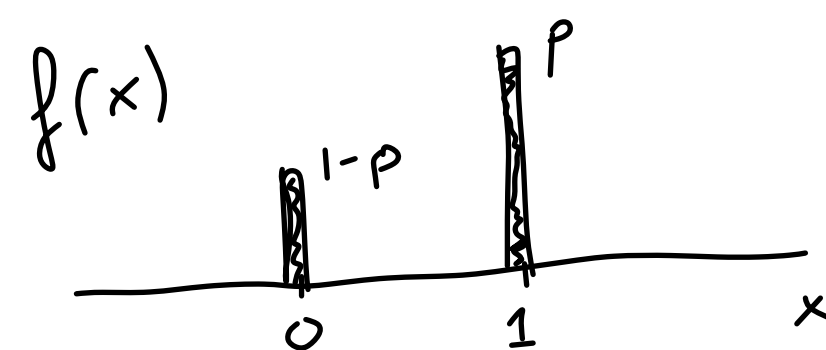
Real number



BERNOULLI

$f(x) = \begin{cases} p & x=1 \\ 1-p & x=0 \end{cases}$
 PDF

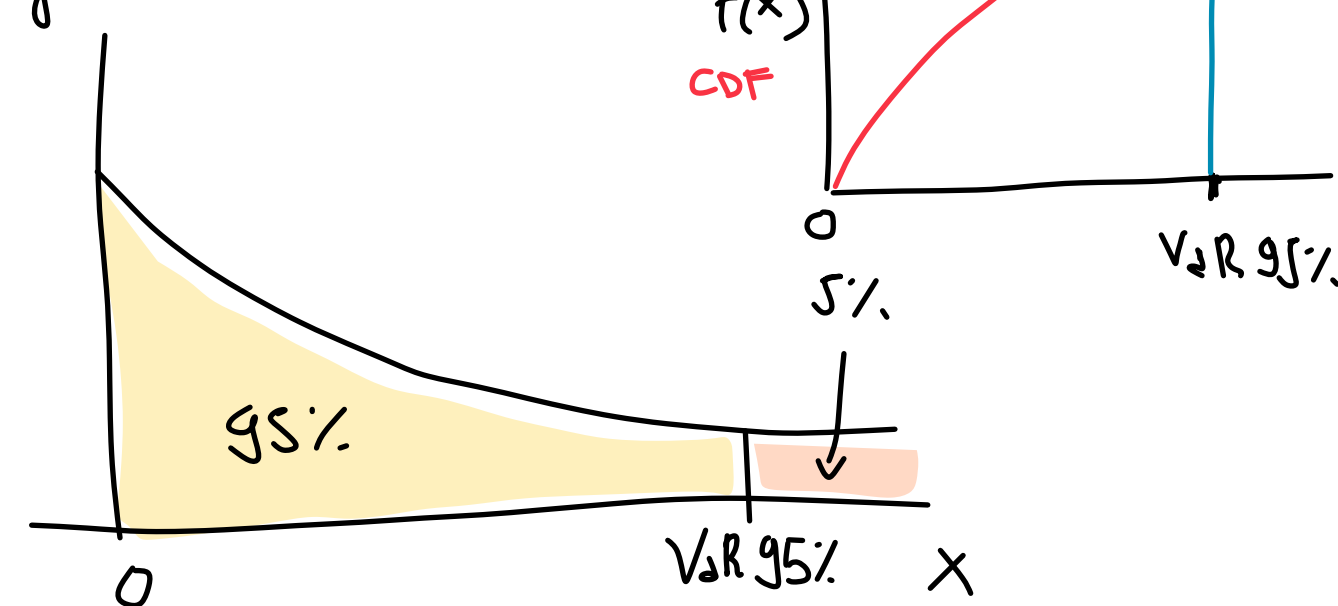
$F(x) = \begin{cases} 0 & x < 0 \\ 1-p & 0 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$
 CDF



EXPONENTIAL $\lambda > 0$

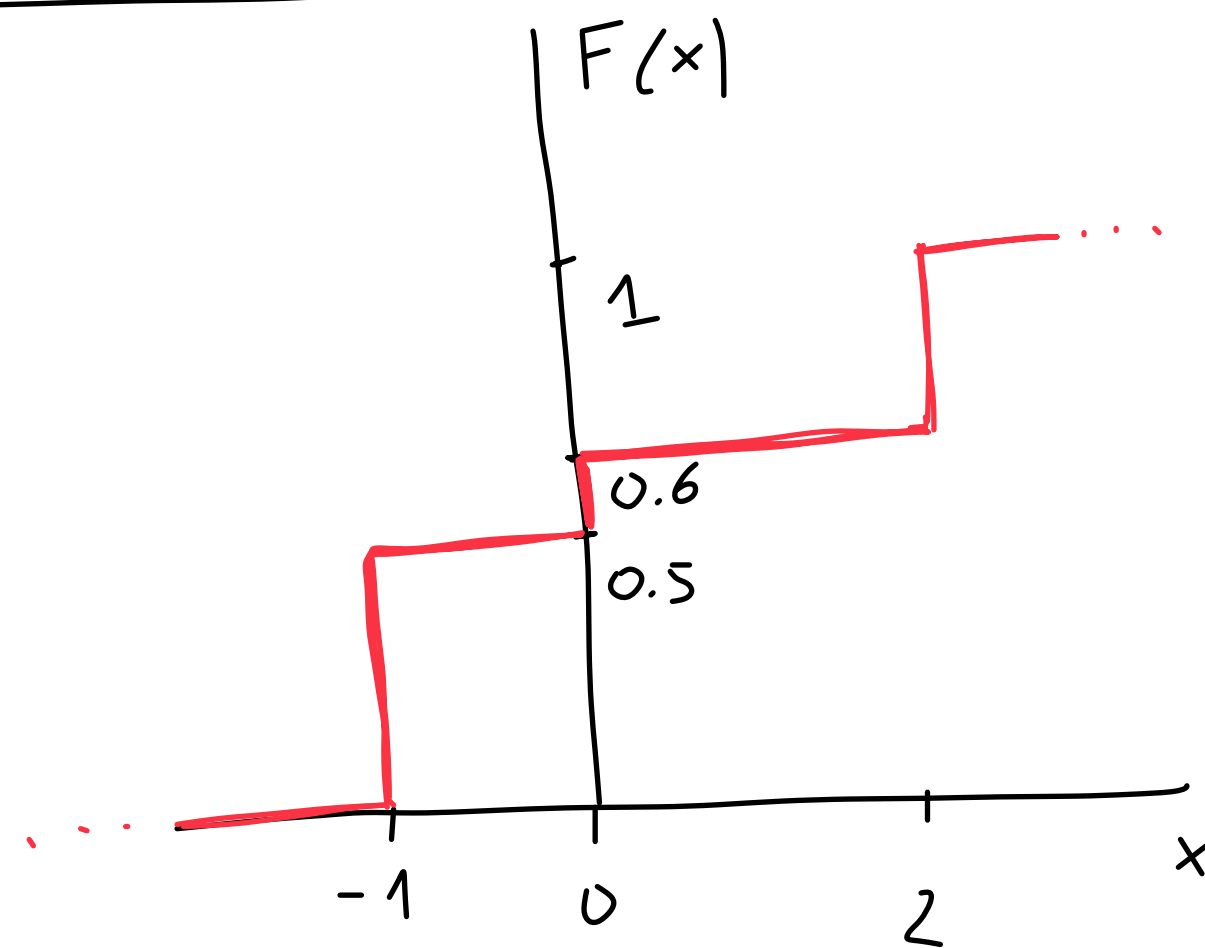
$F(x) = \begin{cases} 1 - e^{-\lambda x} & x \geq 0 \\ 0 & x < 0 \end{cases}$
 $f(x) = \begin{cases} \lambda e^{-\lambda x} & x \geq 0 \\ 0 & x < 0 \end{cases}$

PDF $f(x)$



EXAMPLE (EP 15)

$X = \begin{cases} -1 & p=0.5 \\ 0 & p=0.1 \\ 2 & p=0.4 \end{cases}$



$F(x) = \begin{cases} 0 & x < -1 \\ 0.5 & -1 \leq x < 0 \\ 0.6 & 0 \leq x < 2 \\ 1 & x \geq 2 \end{cases}$
 CDF

$f(x) = \begin{cases} 0.5 & x = -1 \\ 0.1 & x = 0 \\ 0.4 & x = 2 \end{cases}$
 PDF

