확률변수

prob $\rightarrow$ function   mapping each outcome of random experiment

$P(A) \rightarrow P(x)$ ex(P(동전이 앞)

Let A_x be an event
$A_x = \{ w | X(w) = x \}$
$P(A_x) = P_x(X = x)$

example
$A_0 = \{ TT \}$
$A_1 = \{ HT, TH \} \Rightarrow P(A_1) = P(1)$

Distribution function

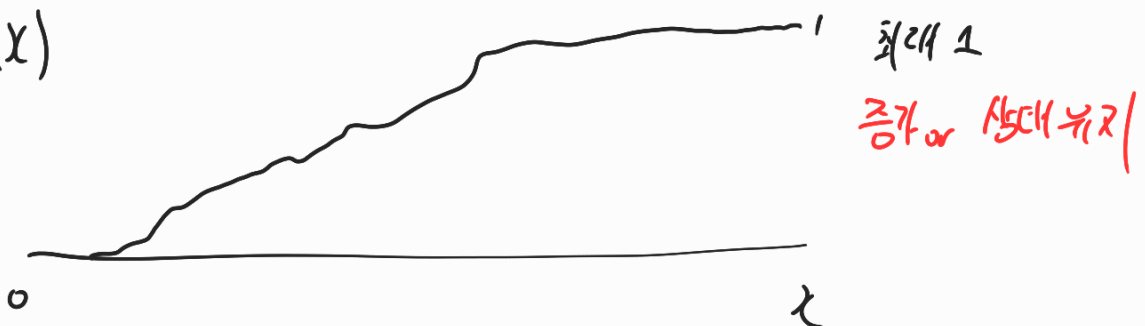for an Rv(Random var) X, a real value x

Culmalative Distribution Function (CDF) 누적도수분포(?)

$\underline{F_X(x) \stackrel{d}{=} P(X \leq x)}$ 누적확률 $X \in \{ 0, 1, 2 \}$

$\rightarrow$ 병의 $F_X(1) = P(X \leq 1) = P(\{ 0, 1 \}) = P(0) \pm P(1)$

$F_X(X)$

최대 1
증가 or 상대유지

① $x_1 < x_2 \rightarrow F_X(x_1) \leq F_1(x_2)$
② $0 \leq F_X(x) \leq 1$
③ $F_X(\infty) = \lim_{x \to \infty} F_X(x) = 1$
④ $F_X(-\infty) = \lim_{x \to -\infty} F_1(x) = 0$
⑤ $P(a < x \leq b) = F_x(b) - F_x(a)$
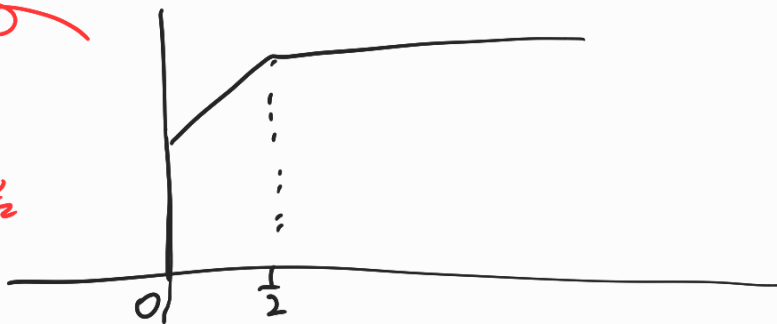⑥ $P(x > a) = 1 - F_x(a)$

문제 2.3

누적확률 x

$$F_X(x) = \begin{cases} 0, & x < 0 \\ x + \frac{1}{2}, & 0 \leq x \leq \frac{1}{2} \\ 1, & x > \frac{1}{2} \end{cases}$$

여 그래프는
[누적]정리에 따라.
해당하는 확률을
누적한 것

$x \leq \frac{1}{4}$

① $P(X > \frac{1}{4}) = 1 - P(X \leq \frac{1}{4}) = 1 - F_X(\frac{1}{4}) = 1 - \frac{3}{4}$

② $P(X > 0) = 1 - \underbrace{F_X(0)}_{\& \ P(X \leq 0)} = 1 - \frac{1}{2}$
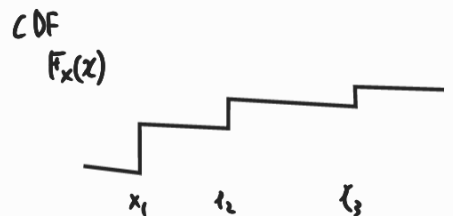
Discrete R.v.

- non-continuous
- Integer

Probability mass function

$P_X(x) = \text{Prob}(X = x)$

$$\boxed{F_X(x) = P(X \leq x) = \sum_{x_i \leq x} P_x(x_i)}$$

↙ Discrete cdf

CDF $F_X(x)$

$f(x) = \frac{3}{2}\delta(x+2) + \delta(x) + \frac{1}{2}\delta(x-1)$

δ를 이산점인 곳에는 1을
취하고 나머지는 0을 취하는
것?