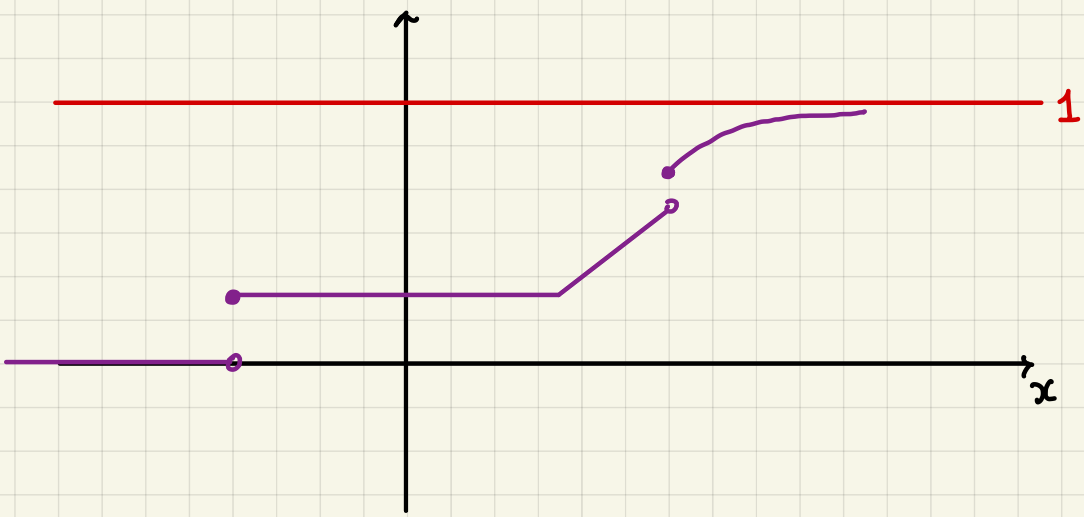
M358K: September 3rd, 2021.

Review:

Def'n: For any random variable X the cumulative distribution f'tion (cdf) of X is a function $F_X : \mathbb{R} \longrightarrow \boxed{[0,1]}$ given by

$$\boxed{F_X(x) = \mathbb{P}[X \le x] \text{ for all } x \in \mathbb{R}}$$



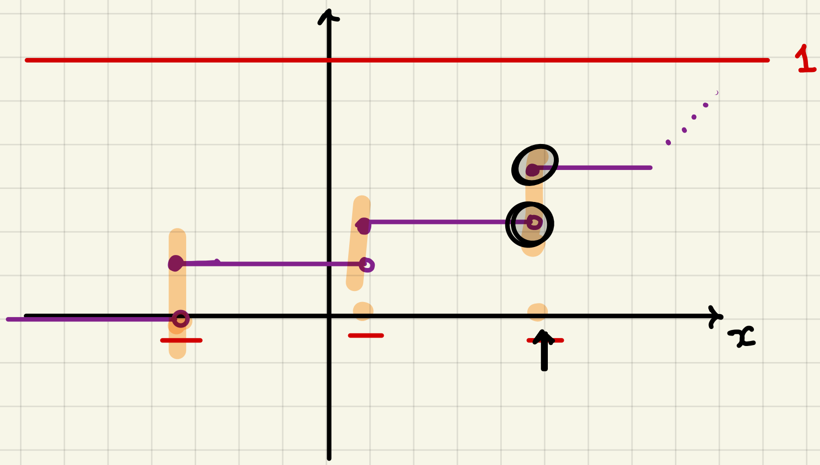
The cdf gives complete information about the distribution of a random variable.

Q: $\lim_{x \to -\infty} F_X(x) = \underline{\quad 0 \quad}$

Q: $\lim_{x \to +\infty} F_X(x) = \underline{\quad 1 \quad}$

Note: Nondecreasing!

Q: What if your cdf is a step function?



Then, your r.v. is DISCRETE, i.e., it can take up to countably many values.

It's usually more convenient to express its distribution using its probability (mass) function (pmf).

In general, the support of a random variable is (vaguely) the set of all the values it can take.

For discrete r.v.s it's the set of all points @ which the cdf jumps.

For those points, i.e., for every x is the support of the discrete r.v. X,

$$p_X(x) = \mathbb{P}[X = x] = \text{size of the jump}$$
$$= F_X(x) - F_X(x-)$$

left limit