

# LEC 9-LIVE

36, 36, 38, 38, 38, 39, 39, 39, 40, 40

x	36	38	39	40
	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{3}{10}$	$\frac{2}{10}$

$$P(X \leq 38) = \frac{5}{10}$$

$$P(X > 38) = \frac{5}{10}$$

↳ 38 is a median

$$P(X \leq 39) = \frac{8}{10}$$

$$P(X > 39) = \frac{2}{10}$$

~~P(X)~~

Any m s.t.

$$P(X \geq m) \geq \frac{1}{2}$$

$$P(X \leq m) \geq \frac{1}{2}$$

Median

DEF

⇒ [38, 39] are medians for this distribution

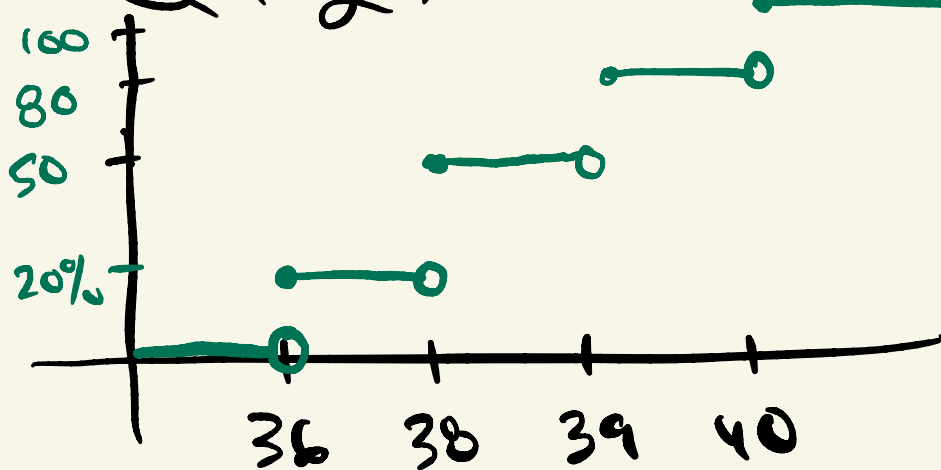
$$P = F_X(x) = \sum_{k \leq x} P(X=k)$$

CDF = cumulative distribution

$$F(s) = P(X \leq s)$$

$$Q(p) = \min \{x \in \mathbb{R} \mid F(x) \geq p\}$$

$Q(\frac{1}{2}) = \text{median}$  The 50th percentile is one of the medians



## NEW, OFFICIAL DEF. of MEDIAN

Def Any number  $m \in \mathbb{R}$

$$\text{s.t. } P(X \leq m) \geq 1/2$$

AND

$$P(X \geq m) \geq 1/2$$

is called the median of  $X$ .

Ex

$k$	36	38	39	40
$P(X=k)$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{3}{10}$	$\frac{2}{10}$

← symmetric

Any  $m \in [38, 39]$  is <sup>a</sup> ~~the~~ median

i.e. Any  $m$  w/  $38 \leq m \leq 39$  ↗