STAT 131
23 Apr 20
(lecture)

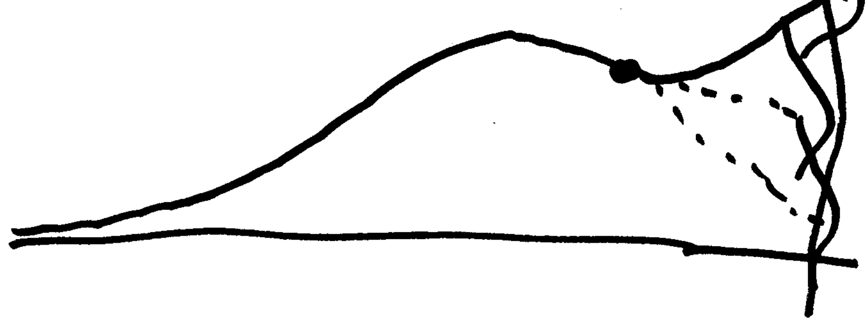
read: DS ch. 3

1

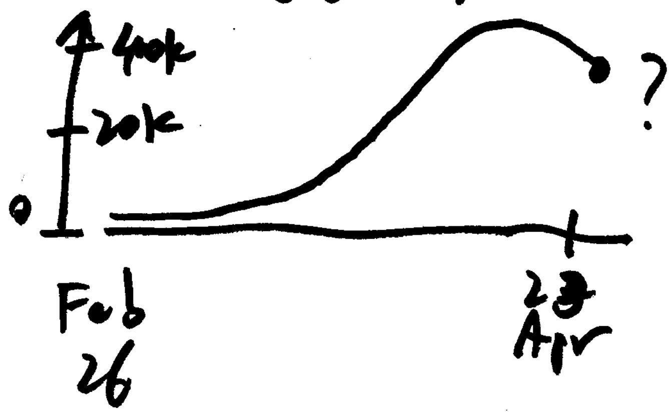
this continuous time: rvs;
next time: PMF, PDF, CDF

example of **predictive uncertainty**, involving **scenario uncertainty**

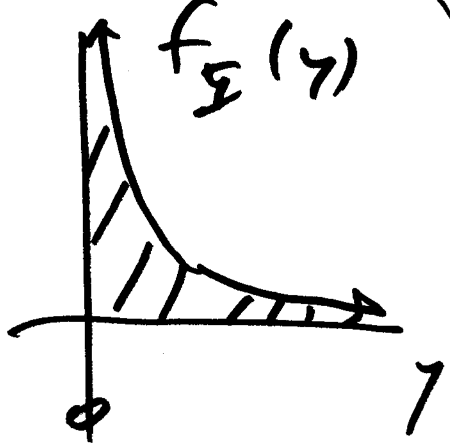
e.g., **social distancing**



new cases daily



STAT 132,
STAT 206



$$P\left(a-\frac{\epsilon}{2} \le Y \le a+\frac{\epsilon}{2}\right)$$

$$= \int_{a-\frac{\epsilon}{2}}^{a+\frac{\epsilon}{2}} f_Y(y)\, dy$$

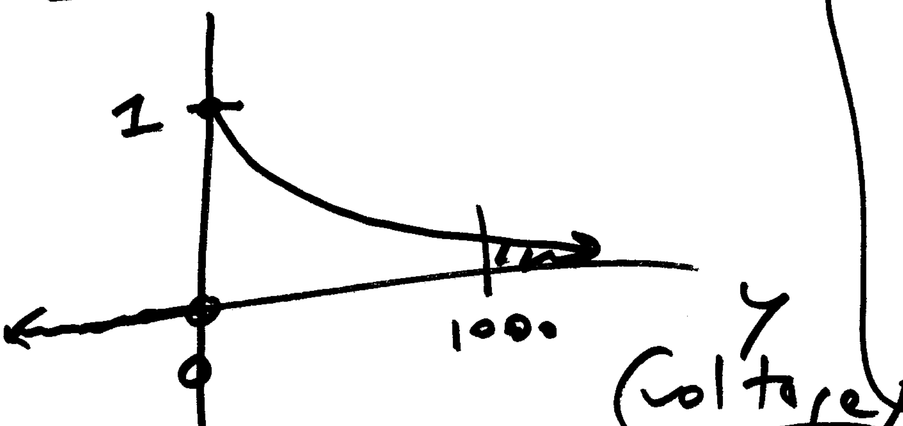
$\doteq$ area of rectangle

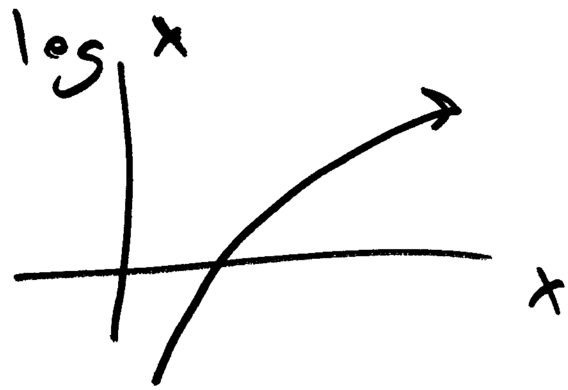
⊛ $= \epsilon \cdot f_Y(a)$

$$P\left(a - \frac{\epsilon}{2} \le Y \le a + \frac{\epsilon}{2}\right) \doteq f_Y(a)$$

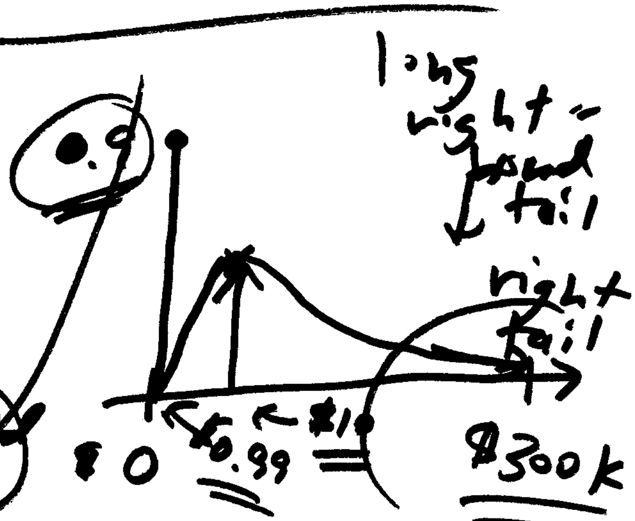
ϵ

$$f_Y(y) = \frac{1}{(1+y)^2} I(y > 0)$$

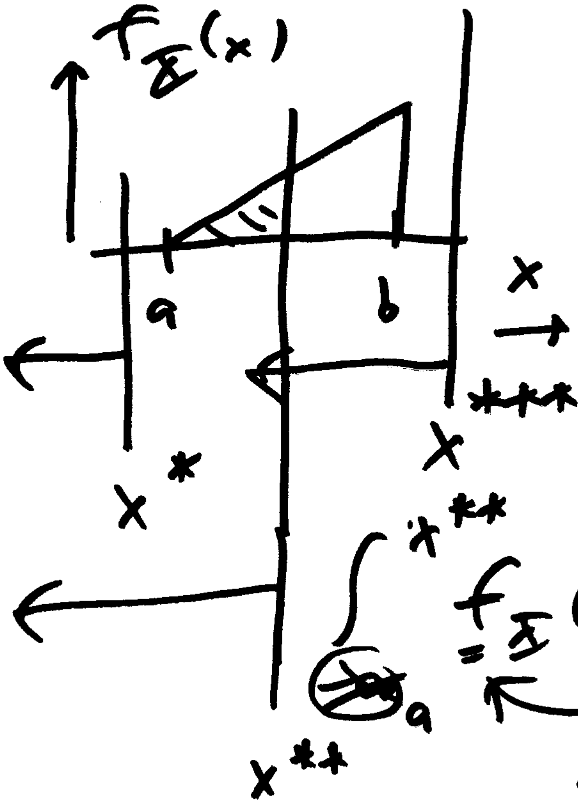




$$\int_{1000}^{\infty} \frac{1}{(1+y)^2}\, dy =$$



X_i = total \$ bought in 4-week period by eBay user i



$$\int_a^{x^{**}} f_X(t)\,dt$$

← PMF or PDF

$$\boxed{P(X \le x^*)} = \begin{cases} 0 & \text{for } x^* \le a \\ \int_a^{x^*} f_X(t)\,dt & a \le x^* \le b \\ 1 & x^* \ge b \end{cases}$$

Cumulative distribution function (CDF) of X

$$F_X(x^*) =$$

CDF

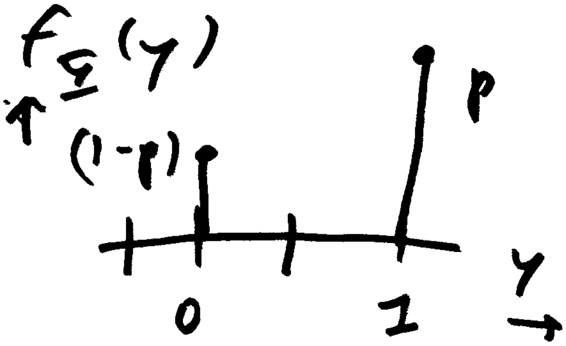
$X \sim \text{Bernoulli}(p)$

PMF? yes

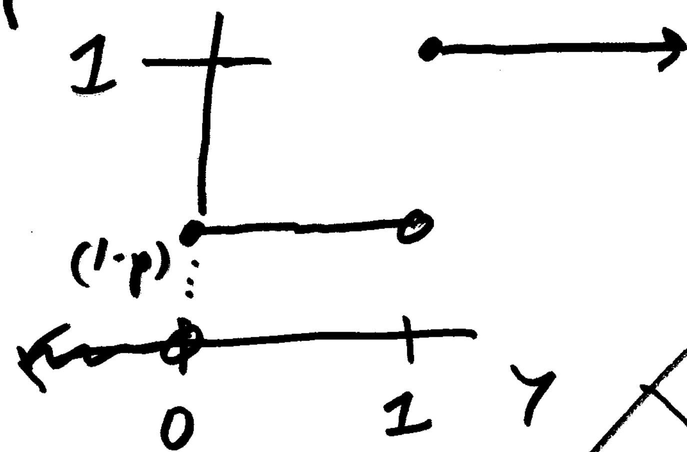
PDF? no

this rv is discrete

$$f_X(y) = \begin{cases} 1-p & y=0 \\ p & y=1 \\ 0 & \text{else} \end{cases}$$



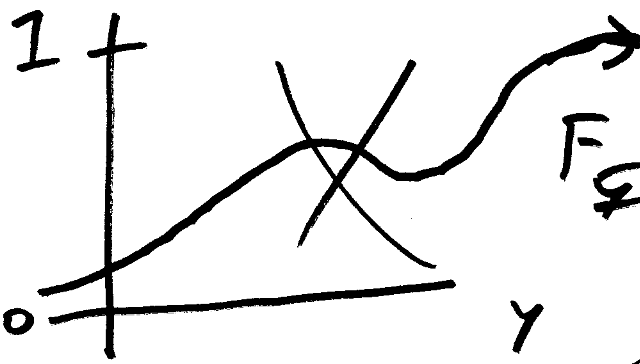
$$F_X(y) = \begin{cases} 0 & \text{for } y<0 \\ 1-p & 0 \le y < 1 \\ 1 & y \ge 1 \end{cases}$$



$F_X(y)$

$\lim_{y \to -\infty} F_X(y) = 0$

$\lim_{y \to +\infty} F_X(y) = 1$



$F_X(y)$

all $F_X(y)$ (CDFs) are <u>monotonic</u>

<u>non-decreasing</u>