

March 11

$$X \sim \text{Uniform}(0, 1)$$

Let m be the median.

Then

$$F(m) = \frac{1}{2}$$

The CDF is

$$F(x) = \begin{cases} 0 & \text{if } x < 0 \\ x & \text{if } x \in [0, 1) \\ 1 & \text{if } x \geq 1 \end{cases}$$

$$F(x) = \frac{1}{2}$$

$$\Rightarrow x = \frac{1}{2}$$

So, median of RV X

$$\text{is } \mu^n = \frac{0}{2}$$

$$X \sim N(0, 1)$$

median = ?

PDF

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}, x \in \mathbb{R}$$

$$\int_{-\infty}^{\infty} f(x) dx = 1$$

$$\int_{-\infty}^0 f(x) dx = \frac{1}{2}$$

Let $X \sim \text{Bernoulli}(\frac{1}{2})$

m is median if

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

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

Claim: $0 \leq m \leq 1$, any
 m is median.

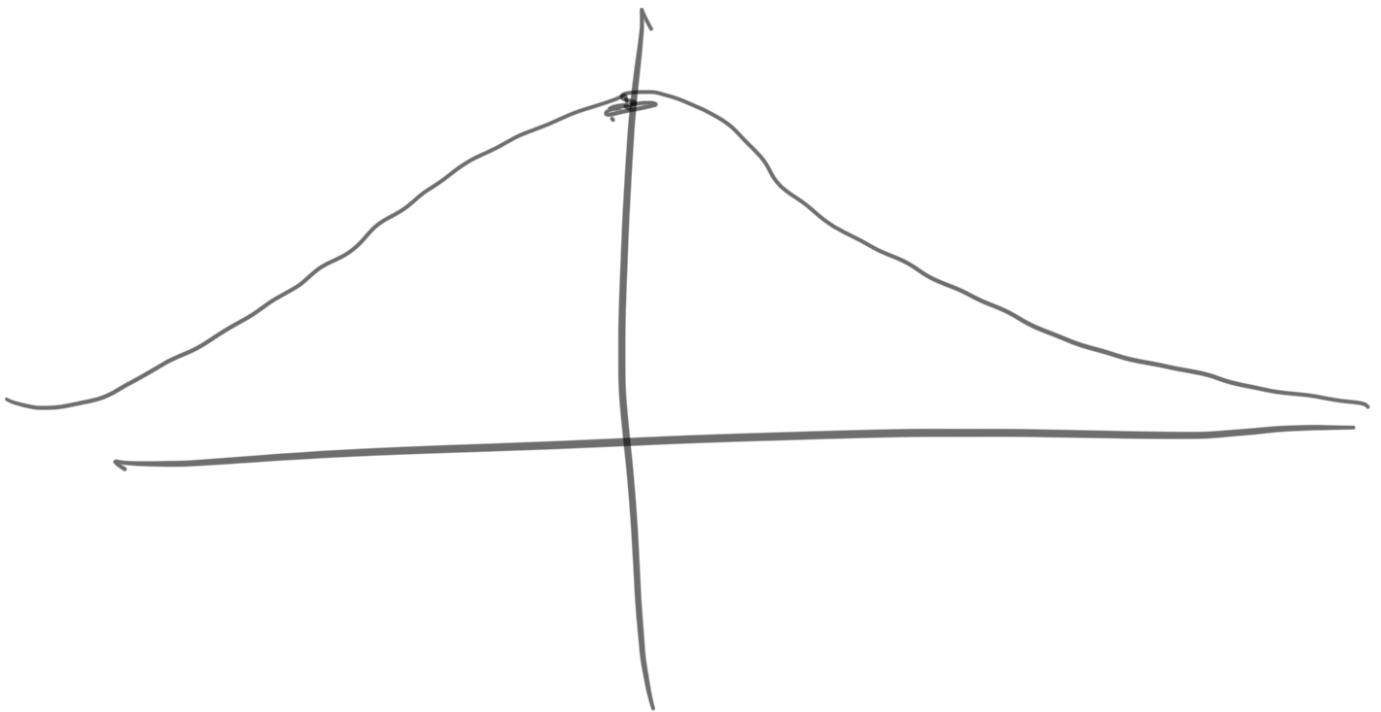
Remark: median may
not be unique

Model

... (0, 1)

$$X \sim N(0, 1)$$

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}$$



$f(x)$ is max at $x=0$

Eg multiple mode



