4/30/19

Tuesday, April 30, 2019 1:31 PM

$P(Y=y)=0$ for all $-\infty<y<\infty$ ← singleton

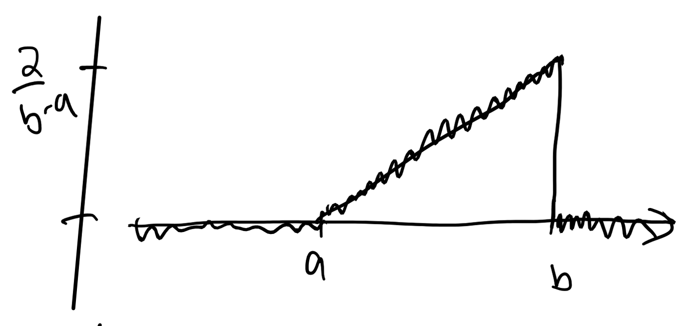
$$\frac{P\left(a-\frac{\epsilon}{2}\le Y\le a+\frac{\epsilon}{2}\right)}{\epsilon}=\cancel{\epsilon}\boxed{f_Y(a)}$$

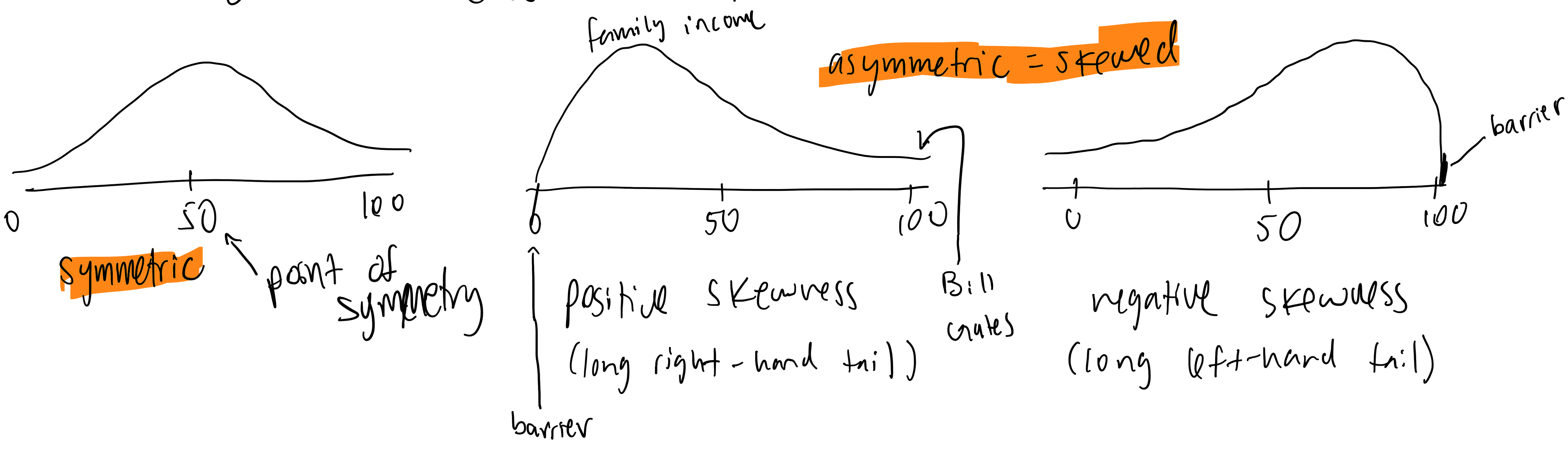
density = concentration of probability

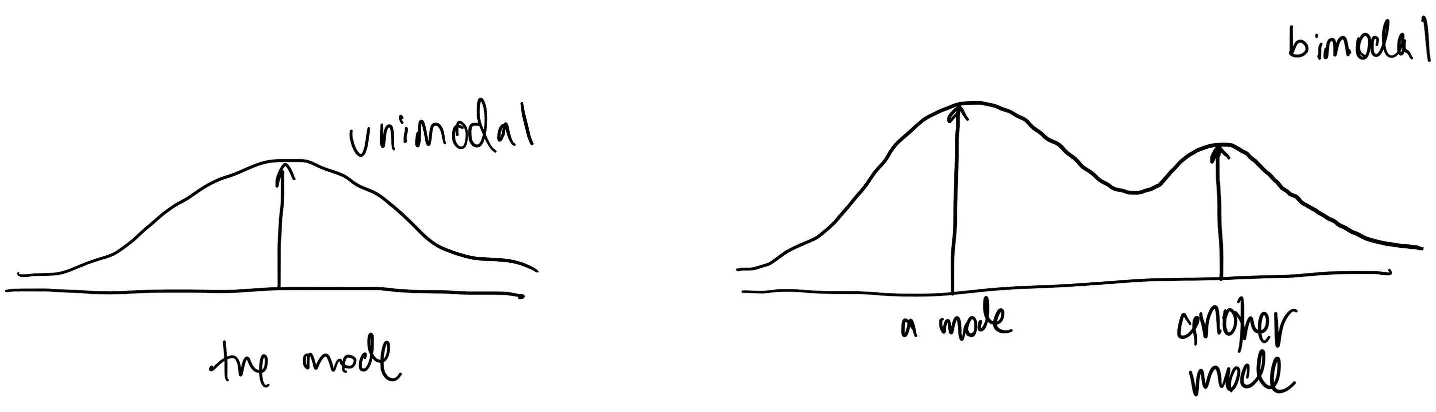
1. $f_Y(y)\ge 0$
2. $\int_{-\infty}^{\infty} f_Y(y)=1$

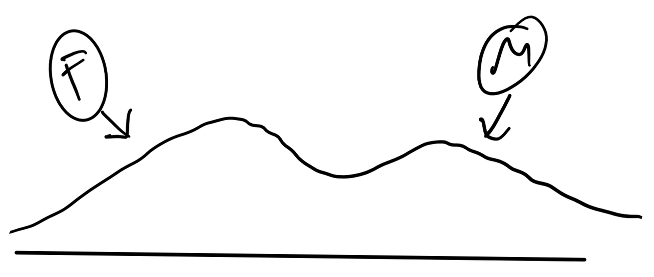
$$\int_a^b c\,\frac{x-a}{b-a}=\frac{1}{2}c(b-a)$$

$$f_Y(y)=\begin{cases}\frac{2(y-a)}{(b-a)^2} & \text{for } a\le y\le b\\ 0 & \text{else}\end{cases}$$









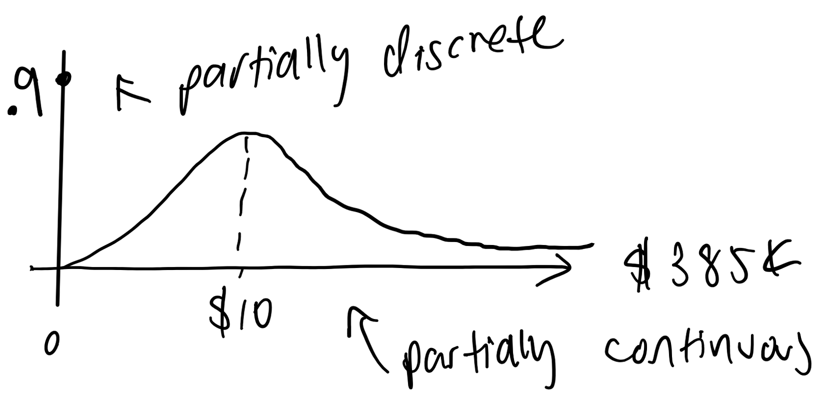
ht. of all AMS131 students (mixture distributions)

Y = voltage

$$f_Y(y)=\begin{cases}\frac{1}{(1+y)^2} & y>0\\ 0 & \text{else}\end{cases}$$

ebay

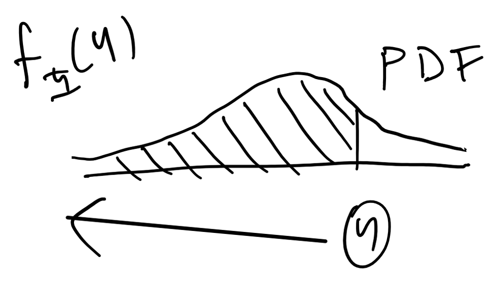
Y = GMB (Gross Merchandise bought) in $(0,T)$



name? "mixed" dist.? yes.

Cumulative distribution function (CDF)

↳ $F_Y(y)=P(Y\le y)$ for all $-\infty<y<\infty$



CDF

$F_Y(y)=P(Y\le y)$ ← cont

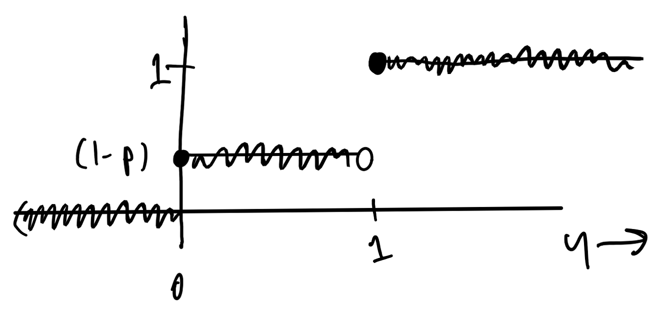
$=\int_{-\infty}^{y} f_Y(t)\,dt$

↑ dummy variable of integration.

$Y\sim$ Bernoulli (p)

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

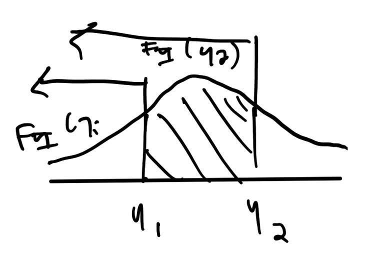
pf: $P(Y=y)=p^y(1-p)^{1-y}\,I_{\{0,1\}}(y)$



$F_Y(y)=P(Y\le y)$

$F_Y(y)=P(Y\le y)$

$\rightarrow P(Y>y)=1-F_Y(y)$



$P(y_1\le Y\le y_2)=\int_{y_1}^{y_2} f_Y(y)\,dy$

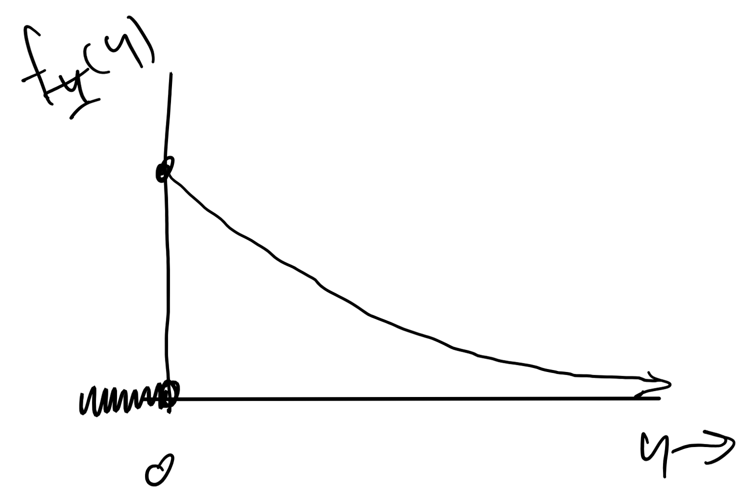
$F_Y(y_2)-F_Y(y_1)$

$F_Y(y)=\int_{-\infty}^{y} f_Y(t)\,dt$

at all continuity points of f

$\frac{d}{dy}F_Y(y)=f_Y(y)$

↑ CDF ↑ PDF



$$f_Y(y)=\begin{cases}\lambda e^{-\lambda y} & y>0\\ 0 & y\le 0\end{cases}$$

CDF of Y:
$$F_Y(y)=\begin{cases}0 & \text{for } y<0\\ 1-e^{-\lambda y} & y\ge 0\\ (1 \text{ as } y\to\infty)\end{cases}$$