this transformation
time:

ideal model

AMS 131
9 May 19
①

good
outcome ↔ remission

$(Y_i \mid \theta_i) \overset{I}{\sim} \text{Bernoulli}(\theta_i)$

$(i = 1, \dots, n)$

can't be fit:

$n$ unknown $(\theta_1, \dots, \theta_n)$

$n$ 1/0 indicators $(B_1, \dots, B_n)$

$\underbrace{A, B}$

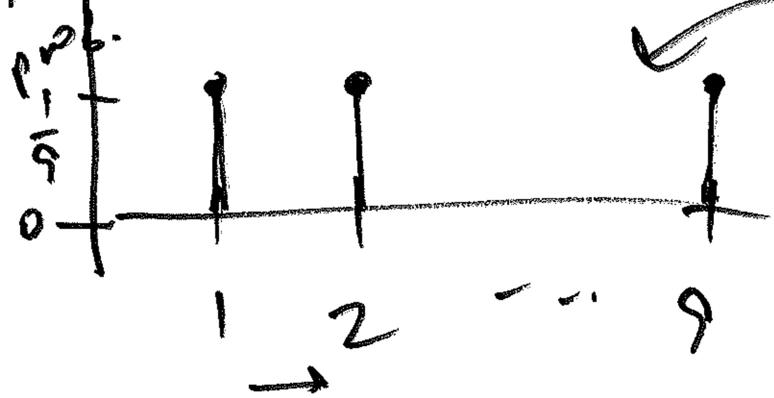
T/F propositions

$P(A \text{ and } B) = P(A) \cdot P(B)$

if $A, B$ indep.

in general

$$f_{Y_1, Y_2, Y_3}(y_1, y_2, y_3) = \underline{f_{Y_1}(y_1)}\, f_{Y_2 \mid Y_1}(y_2 \mid y_1) \cdot f_{Y_3 \mid Y_1, Y_2}(y_3 \mid y_1, y_2)$$

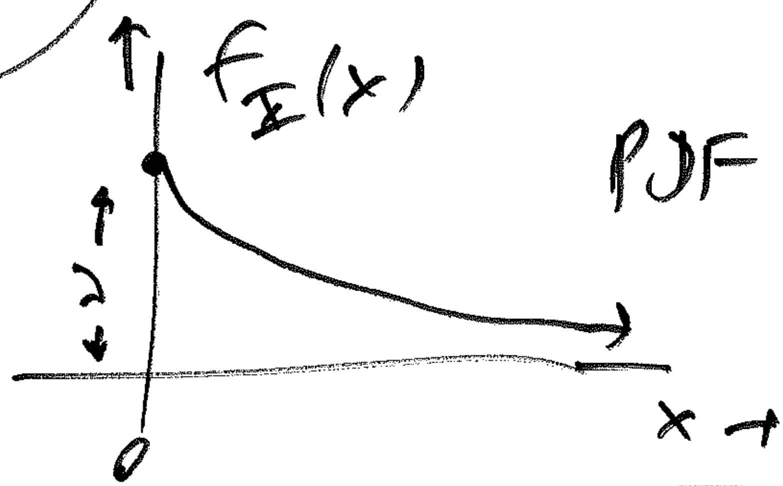



$f_X(x)$

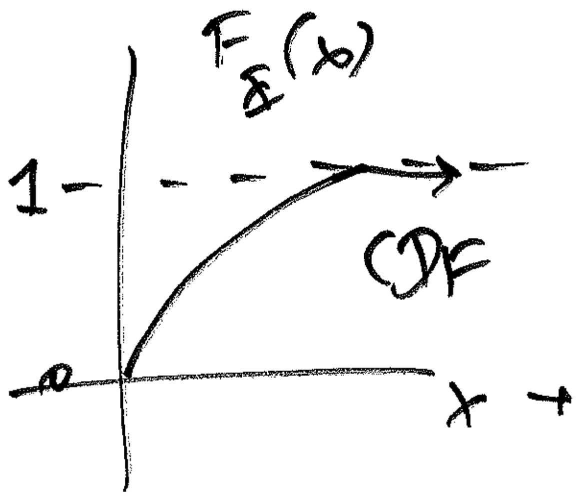
median = 5

$Y = |X - 5|$

$X \sim$ Exponential($\lambda$)




PDF




CDF

$$f_Y(y) = f_X[h^{-1}(y)] \cdot \left|\frac{d}{dy} h^{-1}(y)\right|$$

$$= f_X(x) \left|\frac{dx}{dy}\right|$$

$$f_Y(y)\,|dy| = f_X(x)\,|dx|$$

$y = h(x)$

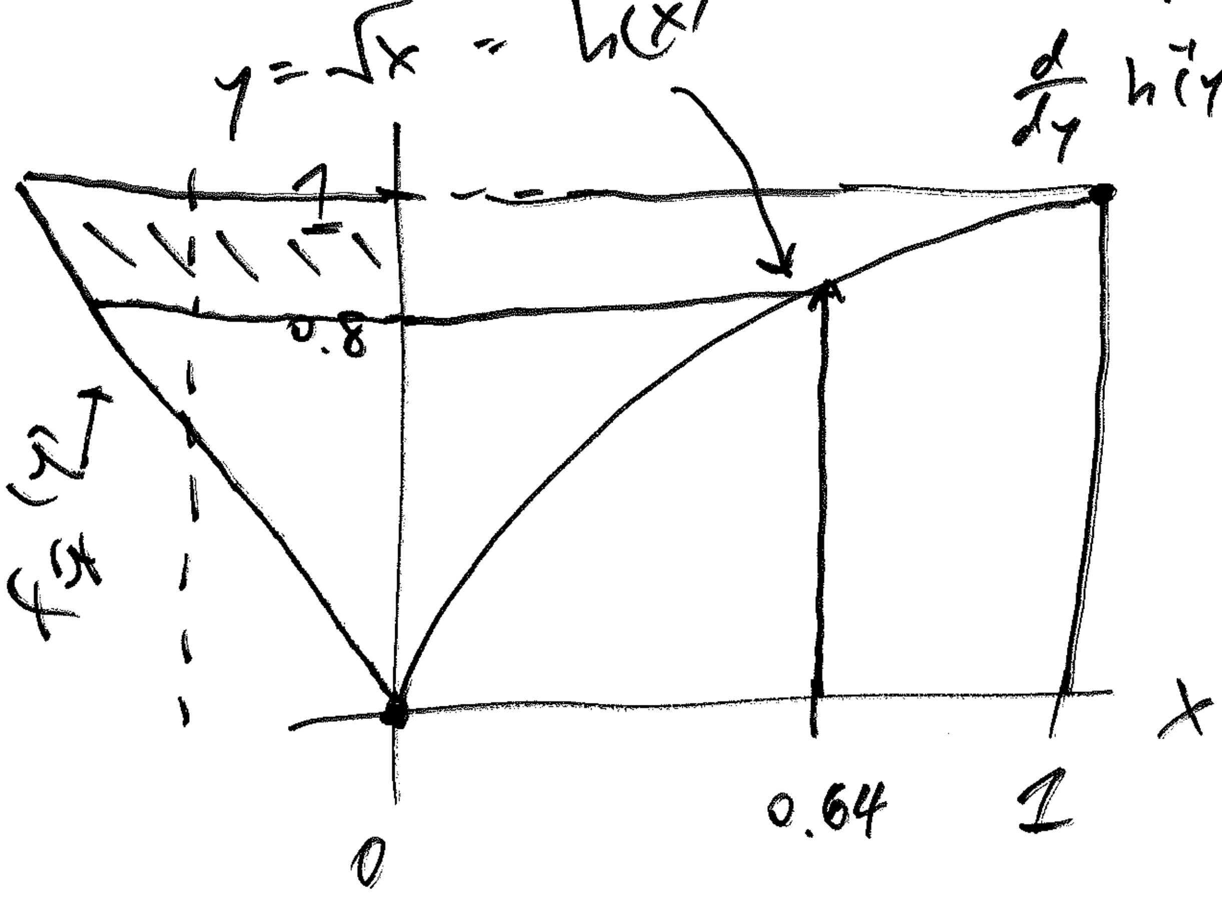
$x = h^{-1}(y)$

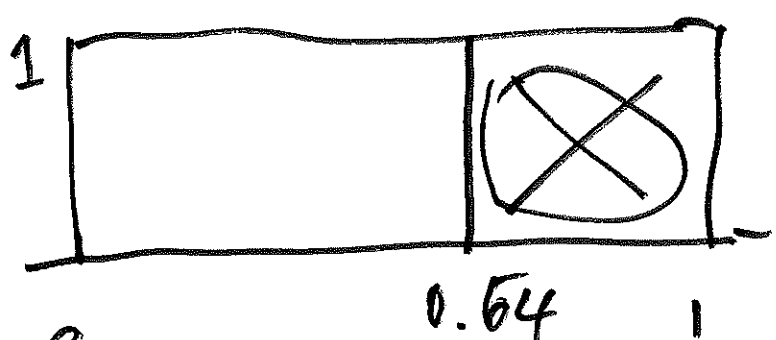
$\mathbb{X} \sim \text{uniform}(0,1)$ (continuous) ③

$\mathbb{Y} \sim \sqrt{\mathbb{X}}$ | $y = h(x) = \sqrt{x} = \cancel{x^{\frac{1}{2}}}$

$x = h^{-1}(y) = y^2$

$\frac{d}{dy} h^{-1}(y) = |2y| = 2y$




$f_{\mathbb{X}}(x) = \begin{cases} 1 & \text{for } 0<x<1 \\ 0 & \text{else} \end{cases}$

$$f_{\underline{Y}}(y) = \begin{cases} \overset{1}{\cancel{f_{\underline{X}}(x)}} \cdot 2y & \text{for } 0<y<1 \\ 0 & \text{else} \end{cases}$$