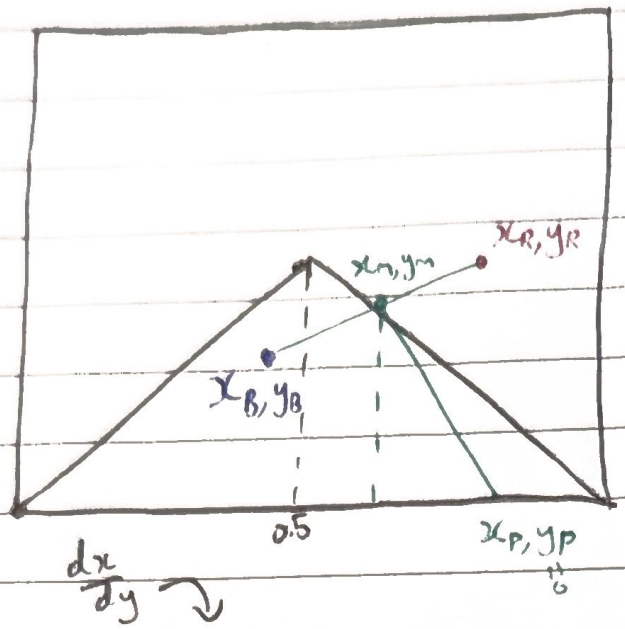


$$\text{Slope } BR = \frac{y_R - y_B}{x_R - x_B}$$

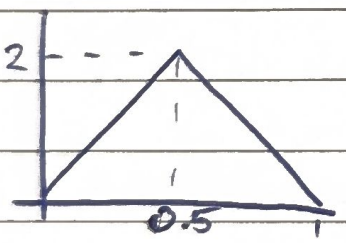
$$\Rightarrow \text{Slope } MP = -\frac{1}{\text{Slope } BR} = -\frac{x_R - x_B}{y_R - y_B}$$

$$x_P = x_m + \frac{1}{\text{Slope MP}}(-y_m) \quad . \quad \text{Want } P(0 < x_P < 1)$$

$$f_{x_R, y_R}(x) = \begin{cases} 1, & 0 \le x \le 1 \\ 0, & \text{o/w} \end{cases}$$

$$x_P = \frac{x_R + x_B}{2} + \frac{y_{R_m} - y_B}{x_R - x_B}\left(\frac{y_R + y_B}{2}\right)$$

Either:

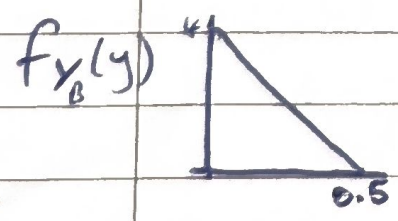


$$f_{x_B}(x) = \begin{cases} 4x & 0 \le x < 0.5 \\ 4 - 4x & 0.5 < x \le 1 \\ 0 & \text{o/w} \end{cases}$$

// $0 \le x_B < \frac{1}{2}$, $y_B \sim U[0, x_B]$ & $0 \le x < 0.5$

$\frac{1}{2} \le x_B \le 1$, $y_B \sim U[0, 1 - x_B]$ $\Rightarrow f_{Y_B|x_B}(y|x) = \begin{cases} \frac{1}{x} & 0 \le y < x \\ \frac{1}{1-x} & x \le y \le 1-x \\ 0 & \text{o/w} \end{cases}$ & $0.5 \le x \le 1$

Or:



$$f_{x_B}(y) = \begin{cases} 4 - 8y & 0 \le y \le 0.5 \\ 0 & \text{o/w} \end{cases}$$

$$x_B \sim U[y_B, 1 - y_B] \Rightarrow f_{x_B|Y_B}(x|y) = \begin{cases} \frac{1}{1-2y} & y \le x \le 1-y \\ 0 & \text{o/w} \end{cases}$$