Practice Test

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Q3: given

$X_1\ X_2\ X_3$ are 3 mutually independent variable

$$f_{X_i}(x) = \begin{cases} 2x\ ;\ 0 \le x_i \le 1 \\ 0\ ;\ \text{otherwise} \end{cases}$$

1) Joint PDF:

- Since $X_i\ ;\ \forall i \in \{1,2,3\}$ are mutally independent
- the marginal pdfs fully describe the joint pdf

$$f_{X_1X_2X_3}(x_1,x_2,x_3) = f_{X_1}(x_1) f_{X_2}(x_2) f_{X_3}(x_3)$$

$$f_{X_1X_2X_3}(x_1,x_2,x_3) = \begin{cases} 8x^3\ ;\ 0 \le x_1 \le 1,\ 0 \le x_2 \le 1,\ 0 \le x_3 \le 1 \\ 0\ ;\ \text{otherwise} \end{cases}$$