

**Let ( X) be uniform random variable on a segment ( [0, 2]). Consider random variable ( Y=X^2).**

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1.1 Find CDF and PDF of Y. 1.2 Is PDF a bounded function?

The CDF(X) can be defined as:  $F_X(x) = P(X \leq x) = \begin{cases} 0 & x < 0 \\ \frac{x}{2} & x \in [0, 2] \\ 1 & x > 2 \end{cases}$

$\Rightarrow$  the CDF of Y is given by  $F_Y(y) = P(Y \leq y) = P(X^2 \leq y) = P(X \leq \sqrt{y}) = \frac{\sqrt{y}}{2}$

Given that X is a uniform distribution on the segment [0,2], Y can take values **only** on the segment [0, 4]  $\Rightarrow$  to obtain PDF we need to find the derivative of the CDF.

$\Rightarrow$  the PDF of Y is given by  $f_Y(y) = \frac{dF_Y(y)}{dy} = \frac{d\sqrt{y}}{2dy} = \frac{1}{4\sqrt{y}}$

$\therefore$  the PDF of Y is an unbounded function.