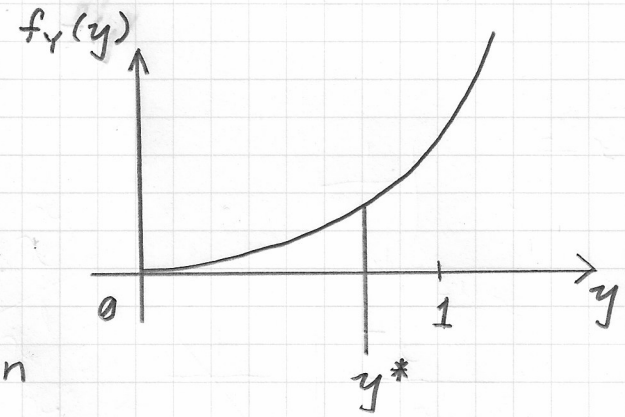
From: Larsen & Marx 13-5-2021

## Median, $y^*$, of a Continuous Probability Distribution

Say, we have a probability density function :-

$$f_Y(f) = 3y^2 \quad 0 \le y \le 1$$




Median is a 50-50 situation where equal chance of events occurs above and below the value of $y^*$

To find $y^*$,

$$\text{set } P(Y < y^*) = \frac{1}{2} = \int_0^{y^*} 3y^2 \cdot dy$$

$$\frac{1}{2} = \frac{3y^3}{3}\Big|_0^{y^*}$$

$$\frac{1}{2} = (y^*)^3$$

$$y^* = \sqrt[3]{\frac{1}{2}} = 0.79 \ \#$$

To verify, set $P(Y > y^*) = \int_{y^*}^{1} 3y^2 \cdot dy$

$$= \frac{3y^3}{3}\Big|_{0.79}^{1}$$

$$= 1 - (0.79)^3$$

$$P(Y > y^*) = 0.5 \ \#$$