

Math 16B  
Kouba  
Continuous Probability, Definitions

Let  $f(x)$  be a probability density function for a continuous random variable,  $x$ , over the interval  $a \leq x \leq b$ .

- 1.) The MEAN,  $\mu$ , or EXPECTED VALUE,  $E(x)$ , of  $x$  is

$$\mu = E(x) = \int_a^b x f(x) dx .$$

- 2.) The MEDIAN,  $m$ , of  $x$  is the value  $m$  in the interval  $a \leq x \leq b$  which satisfies

$$P(a \leq x \leq m) = 0.5 = 1/2$$

or

$$\int_a^m f(x) dx = 0.5 = 1/2 .$$

- 3.) The VARIANCE,  $V(x)$ , of  $x$  is

$$V(x) = \int_a^b (x - \mu)^2 f(x) dx = \int_a^b x^2 f(x) dx - \mu^2 .$$

- 4.) The STANDARD DEVIATION,  $\sigma$ , of  $x$  is

$$\sigma = \sqrt{V(x)} .$$