

The form, or shape, of the normal distribution is the bell shaped curve we met in section 2. The probability density function that defines the bell-shaped curve if the normal distribution is given by

$$f(x | \mu, \sigma) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

where

- $\mu$  = expected value, or mean, of the random variable  $x$ .
- $\sigma$  = standard deviation of the random variable  $x$ .

[Remark - We will never be using this formula]

**Characteristics of the Normal probability distribution** 1) The highest point on the normal curve is at the mean, which is also the median and mode of the distribution.

2) [VERY IMPORTANT] The normal probability curve is bell-shaped and symmetric, with the shape of the curve to the left of the mean a mirror image of the shape of the curve to the right of the mean.

## Characteristics of the Normal probability distribution

- 3) The standard deviation determines the width of the curve. Larger values of the standard deviation result in wider flatter curves, showing more dispersion in data.
- 4) The total area under the curve for the normal probability distribution is 1.

## Characteristics of the Normal probability distribution **5) Useful Rules of Thumb.**

- The mean  $\pm 1$  standard deviation includes 68
- The mean  $\pm 1.96$  standard deviation includes 95
- The mean  $\pm 2.58$  standard deviation includes 99