

## SAMPLING DISTRIBUTION OF SAMPLE MEANS

Suppose we are sampling from a population with mean ( $\mu$ ) and standard deviation ( $\sigma$ ), let  $\bar{X}$  be a random variable representing **sample mean** of  $n$  independently drawn observations. This then means:

- a) The mean of the sampling distribution of sample means is equal to the mean of the population  
i.e.  $\mu_{\bar{X}} = \mu$
- b) The standard deviation of the sampling distribution is  $\sigma / \sqrt{n}$

For probability calculations, we either standardize:

- 1) a single value ( $x$ ) as  $Z = (x - \mu) / \sigma$
- 2) the mean of  $n$  observations as  $Z = (\bar{X} - \mu) / (\sigma / \sqrt{n})$

### Examples

The number of bacteria found in the gut of a bull was approximately normally distributed with mean 740 and standard deviation 20.

- a) what is the probability a randomly selected bull has atleast 760 bacteria count?
- b) What is the probability the mean of 9 randomly selected animals will have a bacteria count of atleast 760?  
(To be done in video)

