Up to now we've been finding probabilities for an individual taken from a population.

What if we take a sample from a population?

It makes sense that if our sample is as large as the population then $\bar{x}$ (sample mean) would equal μ (population mean).

and

s_x (sample s.d.) would equal σ (population s.d.).

So it follows that if n (our sample size) gets larger, $\bar{x}$ and s_x should get closer to the μ and σ.

This is called

The Central Limit Theorem

Not as obvious are the facts that if you take a number of samples:

1. the distribution of the sample's means is normal,

2. the mean of the sample means = population mean,

3. the s.d. of the sample means will be smaller than the s.d. of the population.

The s.d. of the sample means $\sigma_x = \frac{\sigma}{\sqrt{n}}$

and is called the **<u>standard error of the mean</u>**

We can use the Central Limit Theorem to answer questions about samples.

Thing different is the way the z score is calculated.

$$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

e.g. 1

A.C. Neilson reported that children between the ages of 2 and 5 watch an average of 25 hours of television per week. Assume the variable is normally distributed with a s.d. of 3 hours. If 20 children between the ages of 2 and 5 are randomly selected, find the probability that the mean number of hours they watch television will be greater than 26.3 hours.

e.g.2

The average number of pounds of meat (red and poultry) eaten per person in the USA in 2001 is 187.8 pounds. The s.d. is 45 pounds and the distribution is approx. normal.

a. Find the probability that a person selected at random consumes less than 200 pounds per year.

b. If a sample of 40 people is selected, find the probability that the mean of the sample will be less than 200 pounds per year.

That's all folks.