

Standard Error of Mean

- **Standard error** of the mean (SEM) measures how far a sample mean deviates from the actual mean of a population
- S.E. = sample standard deviation/ $\sqrt{\text{number of sampling units}}$

$$\text{Standard Error} = \frac{s}{\sqrt{n}}$$

- S.E. calculated from previous data of wing length = $2.34/\sqrt{100} = 2.34/10 = 0.234$

Confidence limits of the mean

- The standard error of the mean shows how good is the estimate that the sample mean is close to population mean.
- Referring to the normal distribution curve, We are 68% confident that population mean lies within ± 1 S.E. of sample mean.
- We want to be more sure, so 95% or 99% limits are generally used. These can be obtained by multiplying S.E. (standard error) by z score (of Normal probability curve)
- 95% of observations fall within ± 1.96 S.E ($z = \pm 1.96$).
- 99% of observations fall within ± 2.58 S.E ($z = \pm 2.58$).
- The intervals ± 1.96 S.E and ± 2.58 S.E are called 95% and 99% confidence limits respectively.
- 95% confidence limits of wing lengths are $74 \pm (1.96 \times 0.234)$
 $= 74.00 \pm 0.459$