7.3 Point Estimation

- **Sample statistic**: is a sample characteristic such as a sample mean ($\bar{x}$), a sample standard deviation (s), sample proportion ($\bar{p}$), sample variance (s^2), ...

- So, we use sample statistic to estimate the population parameters such as μ, σ, $\hat{p}$ (small p hat), σ^2, ...

- **Point estimator**:
  - The sample statistic $\bar{x}$ "sample mean" is a point estimator of the population mean μ.
  - The sample standard deviation s is a point estimator of the population standard deviation σ.
  - The sample proportion $\bar{p}$ is a point estimator of the population proportion p.

- **Point estimate**: The numerical value obtained for the point estimators $\bar{x}, s, \bar{p}, \ldots$ as an estimate for the population parameters, $\mu, \sigma, p, \ldots$ are called point estimate.

- Sometimes the point estimates differ from the corresponding population parameters because we are taking a sample and not a census.

- **Target population**: is the population we want to make statistical inference about. It is important for the target population to correspond as closely as possible to the sampled population.

Example (Q12 page 265) A survey question for a sample of 150 individuals, yielded 75 Yes responses, 55 No responses and 20 No opinion.

[a] what is the point estimate of the proportion in the population who respond Yes

[b] " " " " " " " " " " " " " " No

[a] $\bar{p} = \frac{75}{150} = 0.5$ [b] $\bar{p} = \frac{55}{150} = 0.367$

Example (Q 13 page 265) A simple random sample of 5 months of sales data provided the following information

Month	Units Sold (x_i)	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
1	94	1	1
2	100	7	49
3	85	-8	64
4	94	1	1
5	92	-1	1
	465		116

[a] Develop a point estimate of the population mean number of units sold per month

[b] = = = = = = standard deviation.

[a] $\bar{x} = \frac{\sum x_i}{n} = \frac{465}{5} = 93$

[b] $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{116}{4}} = 5.39$