Lecture 27 Summary

Chapter 8. Inferences from Large Samples

1) Point Estimation

- (Point) estimator: A statistic intended for estimating a parameter
- (Point) estimate: An observed value of the estimator

Example 1 $\overline{X}$: an estimator of μ
If $x_1 = 5.6,\ x_2 = 4.5$ and $x_3 = 6.1$, then

$$\overline{x} = \frac{5.6 + 4.5 + 6.1}{3} = 5.4$$

is an estimate.

S^2 is an estimator of σ^2.

$$s^2 = \frac{1}{n-1}\left[\sum x_i^2 - \frac{(\sum x_i)^2}{n}\right] = \frac{1}{2}\left[(5.6)^2 + (4.5)^2 + (6.1)^2 - \frac{(16.2)^2}{3}\right] = .67$$

is an estimate.

- Standard error (S.E.): Standard deviation of an estimator
- Point estimation of the mean
  - Parameter: μ
  - Estimator: $\overline{X}$
  - $\mathrm{E}\left(\overline{X}\right) = \mu$
  - $\sigma_{\overline{X}} = \sigma/\sqrt{n} \Longrightarrow \text{S.E.}\left(\overline{X}\right) = \sigma/\sqrt{n}$

2) Large Sample Confidence Interval (CI) for μ

When n is large ($n \geq 30$), a 95% CI for μ is

$$\left(\overline{X} - 1.96\frac{S}{\sqrt{n}},\ \overline{X} + 1.96\frac{S}{\sqrt{n}}\right).$$

- Interpretation of CI's:
  If we construct 95% CI's with different samples, then in the long run, 95% of the CI's will contain μ.

When n is large ($n \geq 30$), a $100(1-\alpha)\%$ CI for μ is

$$\left(\overline{X} - z_{\alpha/2}S/\sqrt{n},\ \overline{X} + z_{\alpha/2}S/\sqrt{n}\right).$$

Values of $z_{\alpha/2}$

$1-\alpha$	.80	.90	.95	.99
$z_{\alpha/2}$	1.28	1.645	1.96	2.58