Practice Set 12   Sampling Distributions Part II

I. Darin wants to know the proportion of page 68 parts passing inspection. Fifty parts were
randomly selected from a recent production run of 1,000 parts and 45 passed inspection.

A. Calculate the proportion of parts passing inspection.

$$\bar{p} = \frac{x}{n} = \frac{45}{50} = .90 \to 90\%$$

B. Darin would like to use last week's data to predict a range for the proportion of future production runs
passing inspection. Calculate the 95% confidence interval for the proportion of parts produced by this
production process passing inspection.

$$\frac{n}{N} = \frac{50}{1,000} = .05 \geq .05$$

Finite correction factor applies.

Note: $\bar{p}$ has been used as an estimate of p.

$$\bar{p} \pm z\sigma_{\bar{p}}$$

$$.90 \pm 1.96(.041)$$

$$.90 \pm .080$$

$$.82 \leftrightarrow .98$$

$$n = 50 \geq 30$$
$$np = 50 \times .9 = 45 \geq 5$$
$$nq = 50 \times .1 = 5 \geq 5$$

Normal approximation
of the binomial applies.

$$\sigma_{\bar{p}} = \sqrt{\frac{\bar{p}(1-\bar{p})}{n}} \sqrt{\frac{N-n}{N-1}}$$

$$= \sqrt{\frac{.9(1-.9)}{50}} \sqrt{\frac{1,000-50}{1,000-1}}$$

$$= .042(.975) = .041$$

C. What assumption is Darin making when using last week's data to predict future manufacturing quality?

Darin is assuming the factors affecting the weight of parts are stable. If tests soon to be explored in this part
of **Quick Notes** indicate the proportion passing inspection is dropping, Darin will investigate these factors.