

COMM 215: Business Statistics

Solution to Practice Problems 2

Sampling Distributions

$$1 \quad a) \quad P(\bar{x} < 240) \text{ or } P(\bar{x} > 260) = P\left(z < \frac{240 - 250}{7.5/\sqrt{20}}\right) + P\left(z > \frac{260 - 250}{7.5/\sqrt{20}}\right)$$

$$P(z < -5.96) + P(z > 5.96) \approx 0$$

$$b) \quad z = 1.04, \quad \frac{x - 250}{7.5} = 1.04, \Rightarrow x = 257.8$$

$$2 \quad \sigma/\sqrt{n} = 5.5/\sqrt{50} = 0.778 \quad P(20 \leq x \leq 23) =$$

$$P\left(\frac{20 - 22}{0.778} \leq z \leq \frac{23 - 22}{0.778}\right) = P(-2.57 \leq z \leq 1.285) = 0.8964$$

$$3 \quad P(\bar{p} \geq 0.10) = P\left(z \geq \frac{0.10 - 0.08}{\sqrt{\frac{(0.08)(0.92)}{400}}}\right) = 0.0708 \quad \sigma_{\bar{p}} = 0.01356$$

$$4 \quad a) \quad \bar{p} = 15/100 = 0.15$$

$$b) \quad P(\bar{p} \leq .015) = P\left(z \leq \frac{0.15 - 0.25}{\sqrt{\frac{(.25)(.75)}{100}}}\right)$$

$$P(z \leq -2.31) = .5 - .4896 = .0104$$

$$5 \quad a) \quad P(\bar{x} \geq 26.2) = P\left(z \geq \frac{26.2 - 25}{3/\sqrt{36}}\right) = P(z \geq 2.4) = .5 - .4918 = .0082$$

b) No, the probability is very small and is therefore very unlikely.

$$6 \quad P(\bar{p} \geq .75) = P\left(z \geq \frac{.75 - .70}{\sqrt{\frac{(.70)(.30)}{200}}}\right) = P(z \geq 1.543) = 0.0618$$

$$7 \quad a) \quad \sigma_{\bar{p}} = \sqrt{\frac{(.10)(.90)}{400}} = 0.015$$

$$b) \quad P(.09 \leq \bar{p} \leq .10) = P\left(\frac{.09 - .10}{.015} \leq z \leq \frac{.10 - .10}{.015}\right) =$$

$$P(-0.67 \leq z \leq 0) = 0.2486$$

$$c) \quad P(\bar{p} < .08) = P\left(z < \frac{.08 - .10}{.015}\right) = P(z < -1.33) =$$

$$.5 - .4082 = 0.0918$$