

Chapter 8.1 & 8.2

Section 8.1

(a) A.

$$(b) P(\bar{X} - \mu < \frac{20 - 21.6}{4.2/\sqrt{40}})$$

$$P\{Z < -2.41\}$$

$$= 0.0080$$

$$(c) P(\bar{X} \leq x) = 0.10$$

$$Z = -1.28$$

$$-1.28 = \frac{x - 21.6}{4.2/\sqrt{40}}$$

$$-1.28 = \frac{x - 21.6}{0.6641}$$

$$x = 20.75$$

The 10% chance of being at or below a Mean oil change time is 20.75.

(a) E.

(b) 1. bell shaped (Normal).

$$2. \mu_{\bar{X}} = 2.45$$

$$3. \sigma_{\bar{X}} = \frac{s.d.}{\sqrt{n}}$$

$$= \frac{1.93}{\sqrt{60}} = 0.2492$$

$$(c) P(2 < X < 3)$$

$$= \frac{2 - 2.45}{1.93/\sqrt{60}} < Z < \frac{3 - 2.45}{1.93/\sqrt{60}}$$

$$= P(-1.81 < Z < 2.21)$$

$$= 0.9513$$

8.1 and 8.2

Option D. (b), (c), (a)

(a) The number of hours sleep is recording for everyday evening. It is varying for every day that a random variable for the study.

(b) Quantitative variable since it can be expressed by numerical measurements.

(c) 10 nights of data

It is a statistic since it represents a sample mean.

(d) The Mean number of hours slept is not a random variable since it can't vary.

8.1 and 8.2 questions

(a) option A.

(b) option D

(c) since the sample size $n = 100$ is more than 5% of the population size and $np(1-p) = 100(0.8)(0.2) = 16 \geq 10$, the distribution of $\tilde{p}$ is normal with $\mu_{\tilde{p}} = 0.8$ and $\sigma_{\tilde{p}} = 0.04$

(d) $\sigma = 0.04$ $\mu = 0.8$

$$P(X > 0.83) = P\left(\frac{0.83 - 0.8}{0.04}\right)$$

$$= P(X > 0.75)$$

$$= 1 - 0.7734$$

$$= \underline{\underline{0.2266}}$$

(e) $\tilde{p} = \frac{73}{100} = 0.73$

$$P(X \leq 0.73) = \left(\frac{0.73 - 0.80}{0.04}\right)$$

$$P(Z \leq -1.75)$$

$$= \underline{\underline{0.0401}}$$

It is unusual since the probability is 0.0401 which is less than 5%.

8.1 & 8.2 Question,

$$n = 290$$

$$\bar{x} = 0.0995$$

$$\delta p = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.0995(1-0.0995)}{290}}$$

$$= \underline{0.0176}$$

$$P(Z \geq \frac{0.0862 - 0.0995}{0.0176})$$

$$= \underline{0.7764}$$

$$(b) \bar{p} = 0.0995$$

$$\delta p = \sqrt{\frac{1(0.0995)(1-0.0995)}{320}}$$

$$= \underline{0.0167}$$

$$P(Z \geq \frac{0.0625 - 0.0995}{0.0167})$$

$$= 0.9868$$

$$(c) P(\bar{p} \geq \frac{15}{300}) = P\left(\frac{\bar{p} - p_p}{\delta p} \geq \frac{\frac{15}{300} - p_p}{\delta p}\right)$$

$$= P\left(Z \geq \frac{0.05 - 0.04}{0.0113}\right)$$

$$= 1 - P(Z < 0.9091)$$

$$= 1 - 0.8186 = 0.1814$$