Chapter 7, Exercises 7-1, Problem # 13

A recent study showed that the modern worker person experiences an average of 2.1 hours per day of distractions (phone calls, e-mails, visits, etc.). A random sample of 50 workers for a large corporation found that these workers were distracted an average of 1.8 hours per day and the population standard deviation was 20 minutes. Estimate the true mean population distraction time with 90% confidence, and compare your answer to the results of the study.

$$\overline{X} - \mathrm{Z}\,(\frac{\sigma}{\sqrt{\mathrm{n}}}) \;<\; \mu < \overline{X} + \mathrm{Z}\,(\frac{\sigma}{\sqrt{\mathrm{n}}})$$

$$1.8 - 1.65\,(\frac{0.33}{\sqrt{50}}) < \; \mu < 1.8 + 1.65\,(\frac{0.33}{\sqrt{50}})$$

$$1.8 - 0.08 < \; \mu < 1.8 + 0.08$$

$$1.72 < \; \mu < 1.88$$

Lower than the previous study

Chapter 7, Exercises 7-2, Problem # 11

A recent study of 28 employees of XYZ company showed that the mean of the distance they traveled to work was 14.3 miles. The standard deviation of the sample mean was 2 miles. Find the 95% confidence interval of the true mean. If a manager wanted to be sure that most of his employees would not be late, how much time would he suggested they allow for the commute if the average speed were 30 miles per hour?

$$\overline{X} - t\,(\frac{\mathrm{s}}{\sqrt{\mathrm{n}}}) \;<\; \mu < \overline{X} + t\,(\frac{\mathrm{s}}{\sqrt{\mathrm{n}}})$$

$$14.3 - 2.052\,(\frac{2}{\sqrt{28}}) < \; \mu < 14.3 + 2.052\,(\frac{2}{\sqrt{28}})$$

$$14.3 - 0.78 < \; \mu < 14.3 + 0.78$$

$$13.52 < \; \mu < 15.08$$

Time = Distance / Speed

Time = 15.08 mile / 30 mile per hour = 0.5 hour

Chapter 7, Exercises 7-3, Problem # 5

The proportion of students in private schools is around 11%. A random sample of 450 students from a wide geographic area indicated that 55 attended private schools. estimate the true proportion of students attending private schools with 95% confidence. How does your estimate compare to 11%?

$$p = \frac{55}{450} = 0.12$$

$$q = 1 - p = 1 - 0.12 = 0.88$$

$$p - (\mathrm{Z})\sqrt{\frac{pq}{\mathrm{n}}} < \mathrm{P} < p + (\mathrm{Z})\sqrt{\frac{pq}{\mathrm{n}}}$$

$$0.12 - (1.96)\sqrt{\frac{(0.12)(0.88)}{450}} < \mathrm{P} < 0.12 + (1.96)\sqrt{\frac{(0.12)(0.88)}{450}}$$

$$0.12 - 0.03 < \mathrm{P} < 0.12 + 0.03$$

$$0.09 < \mathrm{P} < 0.15$$

11% is contained in the confidence interval.

Chapter 7, Exercises 7-3, Problem # 17

It is believed that 25% of U.S. homes have a direct satellite television receiver. How large a sample is necessary to estimate the true population of homes which do with 95% confidence and within 3 percentage points? How large a sample is necessary if nothing is known about the proportion?

$$n = pq\left(\frac{Z}{E}\right)^2$$

$$n = (0.25)(0.75)\left(\frac{1.96}{0.03}\right)^2$$

$$n = 800.33 \quad \backsimeq 801 \text{ homes}$$

$$n = (0.25)\left(\frac{1.96}{0.03}\right)^2$$

$$n = 1067.11 \backsimeq 1068 \text{ homes}$$

Chapter 7, Exercises 7-1, Problem # 25

If the variance of a national accounting examination is 900, how large a sample is needed to estimate the true mean score within 5 points with 99% confidence?

$$\sigma = \sqrt{900} = 30$$

$$n = \left(\frac{Z\ \sigma}{E} \right)^2$$

$$n = \left(\frac{(2.58)(30)}{5} \right)^2 = 239.63 \backsimeq 240 \text{ exams}$$