

Section 2.4 – Practice Problems

1. A study of 50 English teachers found the average time spent marking a term paper was 15.2 minutes with a standard deviation of 2.8 minutes. Find a 95% confidence interval of the mean time for all term papers

$$\bar{x} - z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} < \mu < \bar{x} + z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

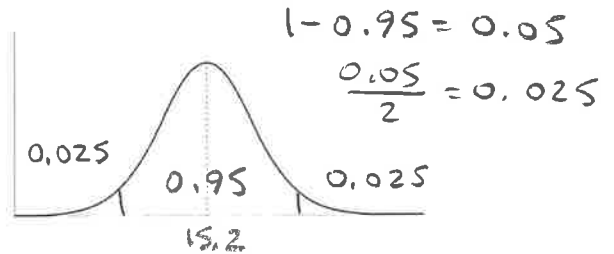
$$15.2 - 1.96 \cdot \frac{2.8}{\sqrt{50}} < \mu < 15.2 + 1.96 \cdot \frac{2.8}{\sqrt{50}}$$

$$15.2 - 0.776 < \mu < 15.2 + 0.776$$

$$14.4 < \mu < 16.0$$

There is a 95% level of confidence that the mean time is between

14.4 min and 16.0 min



$$z_{0.025} = 1.96$$

$$\bar{x} = 15.2 \text{ min}$$

$$s = 2.8 \text{ min}$$

$$n = 50$$

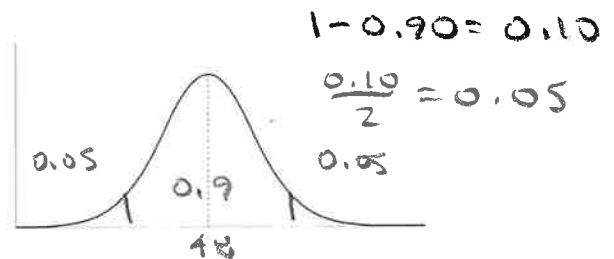
2. Forest companies bid on a large tract of land in the Prince George forest district. A random sample of 150 trees yields a mean diameter of 48 cm with a standard deviation of 5.6 cm. Find a 90% confidence interval for the mean diameter of all trees

$$\bar{x} - z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} < \mu < \bar{x} + z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

$$48 - 1.64 \cdot \frac{5.6}{\sqrt{150}} < \mu < 48 + 1.64 \cdot \frac{5.6}{\sqrt{150}}$$

$$48 - 0.752 < \mu < 48 + 0.752$$

$$47.248 < \mu < 48.752$$



$$z_{0.05} = 1.64$$

$$\bar{x} = 48 \text{ cm}$$

$$s = 5.6 \text{ cm}$$

$$n = 150$$

There is a 90% level of confidence that the mean diameter of the pop<sup>n</sup> is between

47.2 cm and 48.8 cm

3. A real estate firm in Winnipeg takes a random sample of 60 homes. This sample yield a mena of 1800 square feet of living space with a standard deviation of 280 square feet. Construct a 99% confidence level for the mean square footage of living space for all Winnipeg homes.

$$\bar{x} - z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} < \mu < \bar{x} + z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

$$1800 - 2.58 \frac{280}{\sqrt{60}} < \mu < 1800 + 2.58 \frac{280}{\sqrt{60}}$$

$$1800 - 93.261 < \mu < 1800 + 93.261$$

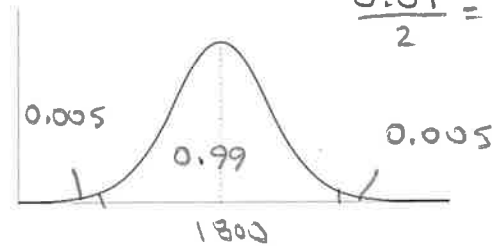
$$1706.7 < \mu < 1893.3$$

$$1710 < \mu < 1890$$

There is a confidence of 99% that the pop<sup>n</sup> average is between 1710 ft<sup>2</sup> and 1890 ft<sup>2</sup>

$$1 - 0.99 = 0.01$$

$$\frac{0.01}{2} = 0.005$$



$$z_{0.005} = 2.58$$

$$\bar{x} = 1800$$

$$s = 280$$

$$n = 60$$

4. A high school teacher wishes to estimate the number of hours a student spends studying each week. The standard deviation from a previous study was 2.5 hours. How large a sample must be selected if the teacher wants to be 98% confident that the true mean differs from the sample mean by 0.75 hours?

$$E < \mu - \bar{x}$$

$$z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} < \mu - \bar{x}$$

$$2.33 \frac{2.5}{\sqrt{n}} < 0.75$$

$$\frac{5.825}{\sqrt{n}} < 0.75$$

$$\frac{5.825}{0.75} < \sqrt{n}$$

$$7.766 < \sqrt{n}$$

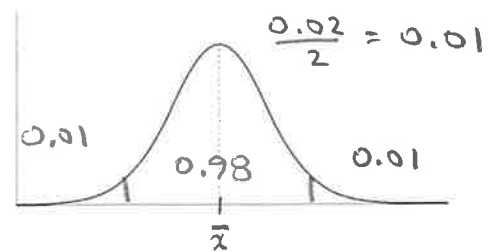
$$60 < n$$

$$n > 60$$

Sample more than 60 students

$$1 - 0.98 = 0.02$$

$$\frac{0.02}{2} = 0.01$$



$$z_{0.01} = 2.33$$

$$\mu - \bar{x} = 0.75 \text{ h}$$

$$s = 2.5$$

$$n = ?$$