

## Math 10 - Homework 4 Answers

1. A researcher wanted to estimate the MPG for municipal busses in a large city. 100 busses were samples and the sample mean price was 9.8 MPG. For the following questions, assume the population standard deviation is 1.2 MPG.

- a. Find a 95% confidence interval for the population mean. Explain what this interval means in the context of the problem.

$$9.8 \pm 1.96(1.2) / \sqrt{100} \rightarrow 9.8 \pm .235 \rightarrow (9.565, 10.035)$$

**We are 95% confident that mean MPG for busses is between 9.565 and 10.035 MPG**

- b. Find a 99% confidence interval for the population mean. Why does the confidence interval have a larger margin of error?

$$9.8 \pm 2.576(1.2) / \sqrt{100} \rightarrow 9.8 \pm .31 \rightarrow (9.50, 10.11)$$

**To be more confident, we need a bigger target, more margin of error.**

- c. Suppose you wanted to redo the sampling or the 95% confidence interval in order to get a margin of error of plus or minus 0.1 MPG. Determine the necessary sample size.

$$n = \left[ \frac{(1.96)(1.2)}{0.1} \right]^2 = 554$$