Name: _____

MAT 222
Fall 2019
Homework 2

"I'm scared that I'm not myself and I'm scared that I am"
  — Piper Chapman, Orange is the New Black

Problem 1: Find the $z_{\alpha/2}$ value, i.e. the z^* value, for the confidence interval corresponding to the following α values:

(a) $\alpha = 0.20$, $z_{\alpha/2} =$ _____

(b) $\alpha = 0.08$, $z_{\alpha/2} =$ _____

(c) $\alpha = 0.02$, $z_{\alpha/2} =$ _____

(d) $\alpha = 0.07$, $z_{\alpha/2} =$ _____

Problem 2: What is the confidence level for each of the following confidence intervals for μ?

(a) Confidence Level: _____ ; $\bar{x} \ \pm \ 1.96 \cdot \dfrac{\sigma}{\sqrt{n}}$

(b) Confidence Level: _____ ; $\bar{x} \ \pm \ 1.41 \cdot \dfrac{\sigma}{\sqrt{n}}$

(c) Confidence Level: _____ ; $\bar{x} \ \pm \ 1.23 \cdot \dfrac{\sigma}{\sqrt{n}}$

Problem 3: Name 3 ways of decreasing the size of a confidence interval and a brief explanation of why your answer works:

Problem 4: A random sample of 45 observations from a population produced the following summary statistics:

$$\sum x_i = 3654 \qquad \sum (x_i - \bar{x})^2 = 2475$$

(a) Assuming the sample standard deviation is approximately the true standard deviation, construct a 95% confidence interval for the population mean μ.

(b) Interpret your answer from (a).

Problem 5: A company in the US Southwest is secretive about what they pay their employees per hour. You go around to 39 different stores and ask 82 different employees their hourly pay. You find an average hourly pay of $17.50/hr.

(a) Assuming the company's standard deviation in wages follows the normal standard deviation in store hourly pay of $1.32/hr in the Southwest, construct a 90% confidence interval for their average employee hourly pay.

(b) Assuming your confidence interval contains the population mean, what is the maximum possible error in your estimation of μ in (a)?

(c) How many employees would you have to randomly sample to estimate their hourly pay within $0.16? [Assume the same level of confidence as the previous parts.]

(d) In practice, does the method you used in (c) to find a minimal sample size to estimate a population mean μ with margin of error m sufficient?

Problem 6: Determine if the following statement is True or False: "The margin of error m takes into account all the error in estimating the population mean μ."