Name: _____

MATH 108
Spring 2023
HW 11: Due 03/31

"There is no such thing as absolute value in this world. You can only estimate what a thing is worth to you."

– Charles Warner

Problem 1. (10pt) A group of entomologists have discovered a new type of beetle and are trying to determine their average size. They assume that the beetle's size will vary like other beetles genetically similar, where the standard deviation in their length is 0.07 cm. They take a random sample of 50 beetles and find an average length of 1.9 cm. Find a 95% confidence interval for the size of this beetle.

Problem 2. (10pt) Suppose that you have a normal distribution $N(556, 62.8)$. Let X denote a random sample from this distribution and let $\overline{X}$ denote the average value of a simple random sample of size 27. Compute the following:

(a) $P(X < 540)$

(b) $P(X > 540)$

(c) $P(\overline{X} < 540)$

(d) $P(\overline{X} > 540)$

Problem 3. (10pt) Suppose that a certain drug is advertised as being 90% effective at treating the symptoms of a certain chronic illness. To determine the validity of this claim, you perform a study on 150 people and count the number of people for which this drug is effective at alleviating their symptoms. Compute the following:

(a) The probability that the drug is effective for less than 130 of the test subjects.

(b) The probability that the drug is effective for more than 140 of the test subjects.

(c) The probability that the drug is effective for between 130 and 140 of the test subjects.

(d) The probability that the drug is effective for less than 120 of the test subjects.