MATH 448 Bonus Homework 4, due Wednesday, November 20

Each of the following four problems can be completed for a 1% bonus applied to Exam 4, for a total of at most a bonus of 4%.

All of these problems concern a MATH 448 exam from years ago, in which 24 students took the exam and earned the following scores:

84 96 71 60 73 90 88 65 82 30 50 49

45 62 96 80 60 74 67 87 87 59 74 79

The premise of these problems is that the exam has an inherent, underlying difficulty level that may or may not be accurately measured by this data set of students who could be either exceptionally strong or exceptionally weak or who could have just been having an exceptionally good day or an exceptionally bad day. That is, the exam has an unknown underlying population mean μ and an unknown underlying standard deviation σ.

1. Construct a two-sided 95% confidence level confidence interval for μ.

2. One student believes that the exam is unfairly hard and claims that an average student across the whole population would get an F on it. Support or refute the student's claim by calculating bounds for the p-value for the hypothesis $H_0 : \mu \leq 59$. Then decide, is this hypothesis plausible?

3. You want to construct a two-sided confidence interval whose length is exactly 10. Using the appropriate table from the book (and given out in class), estimate the confidence level of such a confidence interval by giving the smallest possible upper bound and the largest possible lower bound that you can discern from the table.

4. Due to the presence of at least 1 outlier, it is possible that a sample trimmed mean obtained by eliminating the top 2 scores and bottom 2 scores would be a better point estimate for μ. Conduct a hypothesis test for the hypothesis that μ is equal to this particular sample trimmed mean by computing the t-statistic and calculating bounds for the p-value for the test. Then decide, is this hypothesis plausible?