Math 483 HW 19 2023. Due Monday, Nov. 13. **One page, problems A)-E).** Quiz 8 on Friday, Nov. 10: Forwards calculations with $\overline{Y}$ (CLT), method of transformations, normal approximation to the binomial, MSE, bias, large and small sample CI's for μ (see HW 17 E and HW 18 F), mgf of a sum.

A) 8.88 The EPA has collected data on LC50 measurements for DDT (concentrations that kill 50% of test fish) for a certain species of fish. The measurements for 12 experiments were 16, 5, 21, 19, 10, 5, 8, 2, 7, 2, 4, 9. Assume the CLT holds and find a 90% CI for the mean LC50 of DDT.

comment: Make a table with headers Y_i, $Y_i - \overline{Y}$, and $(Y_i - \overline{Y})^2$ to find $\overline{Y}$ and S. See p. 9, 10, ex. 8.1, and ex. 8.11.

B) 8.90b The SAT scores for fifteen high school students intending to major in engineering were compared to the scores of fifteen students intending to major in language and literature. Find a 95% CI for the difference in average math scores of students majoring in engineering (population 1) and of those majoring in language/literature (population 2).

		Verbal		Math
Engineering	$\overline{y} = 446$	$s = 42$	$\overline{y} = 548$	$s = 57$
Language/Lit.	$\overline{y} = 534$	$s = 45$	$\overline{y} = 517$	$s = 52$

comment: Assume $\sigma_1^2 = \sigma_2^2$ and assume that the appropriate method can be used. See ex. 8.12.

C) 8.96 The carapace lengths (in mm) of 10 lobsters are
78, 66, 65, 63, 60, 60, 58, 56, 52, 50.
Find a 90% CI for σ^2.

comment: Assume $S^2 = 571.6/9$ and assume that the appropriate method can be used. See ex. 8.13.

D) 8.98 Given a random sample of size n from a normal population of unknown mean and variance, a CI for the population variance σ^2 was developed in Section 8.9. What is the formula for a confidence interval for the population standard deviation σ?

comment: If (a, b) is a CI for σ^2, then $(\sqrt{a}, \sqrt{b})$ is a CI for σ.

E) 8.102 MODIFIED The ages of a random sample of five university professors are 39, 54, 61, 72 and 59. Find a 99% confidence interval for the population variance of the ages of all professors at the university, assuming that the ages are normally distributed. Assume $S^2 = 144.5$.

comment: See ex. 8.13. Get the CI for σ^2 (not for σ as in the book). Use the χ^2 Table 6 in the appendix in the back of the book.