	Score	
1		/8
2		/12
3		/12
4		/6
5		/8
6		/6
7		/16
8		/16
9		/8
10		/10
Total		/100

- No books or notes (in any form) allowed.

- You may use a calculator and the formula sheet.

- Clearly indicate your answers.

- All answers must have work or justification. If you use the calculator extensively, be sure to write down the formula you are using.

- Most explanations need only be 1-2 sentences.

- Write all confidence intervals in the notation:
  lower limit < parameter < upper limit

- **Show all your work** – partial credit may be given for written work.

- Good Luck!

1. (8 pts). Find the minimum sample size needed for the following proposed study. A study is designed to find a 99% confidence interval estimate with a margin of error of no more than 0.1 years for the mean battery life of a certain brand of double-A batteries. Assume the battery life is known to be normally distributed with a standard deviation of 0.82 years.

2. (12 pts). In a survey of 140 randomly chosen professional singers, 46 of them stated they were unable to play any musical instrument. Find a 88% confidence interval estimate for the proportion of professional singers who are unable to play any musical instrument.

3. (12 pts). Construct a 95% confidence interval for the population mean given the following information: $n = 60, \bar{x} = 857$. Assume that the population standard deviation is known to be 121.

4. (6 pts). For the given claim, express the null hypothesis and alternative hypothesis in symbolic form. Be sure to use the correct symbol (p, μ, σ) for the indicated parameter.

The percentage of college students who receive financial aid is at least 65%.

5. (8 pts). Find the P-value or range of P-values if the test statistic is $z = 1.31$ and $H_1 : \mu \neq 0.32$.

6. (6 pts). A confidence interval for a population mean is to be estimated. For each problem, decide whether to use z or t or state that neither the normal nor the $t-$distribution applies.

(a). $92\%; n = 13; \sigma$ is unknown; population appears to be skewed.

(b). $90\%; n = 33; \sigma$ is known; population appears to be normal.

(c). $99\%; n = 115; \sigma$ is unknown; population appears to be uniform.

7. (16 pts). The data below are FICO credit scores from 9 applicants for car loans at a new branch of a bank. Use a 0.05 significant level to test the claim that the standard deviation of credit scores from the new branch is less than main office standard deviation of 83 points. [Assume the population is normally distributed.] <u>Use the traditional method</u>. Show all steps and write your final conclusion in nontechnical terms that relate to the original claim.

661   548   791   672   492   762   769   734   583

8. (16 pts). In a sample of 50 randomly selected women drivers aged 25-32, the mean driving distance for one year is $\bar{x} = 7124$ miles with a standard deviation $s = 3001$. Use a 0.10 significance level to test the claim that the population mean driving distance for women in the 25-32 age bracket is more than 6047 miles (the mean for women in a lower age bracket). <u>Use the P-value method</u>. Show all steps and write your final conclusion in nontechnical terms that relate to the original claim.

9. (8 pts). Given a sample size of $n = 30$ and a confidence level of 90%, find the critical values χ^2_L and χ^2_R

10. (10 pts). *True or False.* Determine whether the following statements are true or false.

T   F   A 90% confidence interval for the population proportion guarantees that the population proportion will be within that interval.

T   F   The 95% confidence intervals for the mean starting salary of male and female college graduates given below support the claim that the mean starting salary of female college graduates is lower than the mean salary of male college graduates.

Female: $\$32,570 < \mu < \$55,680$
Male: $\$34,610 < \mu < \$60,110$

T   F   If a null hypothesis is rejected with a significance level of $\alpha = 0.05$, it must also be rejected with a significance level of $\alpha = 0.01$

T   F   If a null hypothesis is rejected with a significance level of $\alpha = 0.01$, it must also be rejected with a significance level of $\alpha = 0.05$

T   F   The normal quantile plot below depicts sample data that comes from a population with a normal distribution.