MATH 140   **Name** _____   **Date:**

Worksheet: Inference on a population mean

1. **Do Linfield students sleep less than 8 hours a night, on average?** To help answer this question we can devise a test of significance. Let $\mu =$ the true mean hours of sleep per night among Linfield students.

    (a) State the null and alternative hypotheses for your test.

    (b) Now suppose you collect the following data: A SRS of size 100 Linfield students yields a sample mean of 7.8 hours of sleep a night, with a sample standard deviation of $s = 0.8$ hours. Determine the test statistic for these data.

    (c) Compute the P-value for these data. Are these data statistically significant at the $\alpha = .05$ level?

2. **Nicotine in cigarettes**. To determine whether the mean nicotine content of a brand of cigarettes is different than the advertised value of 1.4 milligrams, a health advocacy group tests $H_o : \mu = 1.4$ vs $H_a : \mu \neq 1.4$. The calculated value of the test statistic from a sample of size $n = 100$ is $t = 2.42$.

    (a) Below is a sketch of the t_{99} distribution. Shade the area that corresponds to the P-value for this test.
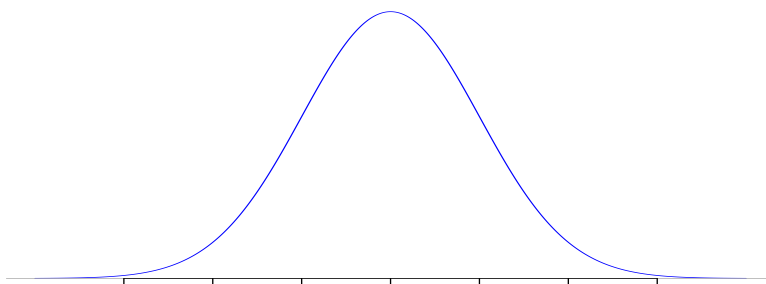
(b) Determine the P-value for this test, and conclude whether these data are statistically significant at the 5% level.

3. **Are aliens just interested in meeting smart people?** The IQ of adults in the US varies normally with mean $\mu = 100$. In a 1993 study, researchers took a sample of 25 people who claimed to have had an intense experience with an unidentified flying object (UFO). The sample mean IQ of this group was $\bar{x} = 107.6$, with sample standard deviation $s = 8.9$.

Conduct a test of significance at significance level $\alpha = .05$ for assessing whether the sample data support the belief that the mean IQ among all people who have had intense UFO experiences exceeds 100. [That is, are the aliens just interested in the smart people?]. State hypotheses, calculate the test statistic, determine the p-value, and state your conclusion in the context of this problem.