Name:

MATH 321: In-Class 7-6

1. Two methods for teaching reading were applied to two randomly selected groups of elementary schoolchildren and then compared on the basis of a reading comprehension test given at the end of the learning period. The sample means and variances computed from the test scores are shown below. Assume scores for both methods are normally distributed with unknown, common variance σ^2.

   Method I : $n_1 = 11, \bar{x}_1 = 64, s_1^2 = 52$ Method II : $n_2 = 14, \bar{x}_2 = 69, s_2^2 = 71$

   (a) Do the data present sufficient evidence to indicate a difference in the mean scores for the populations associated with the two teaching methods? Use $\alpha = 0.10$ and make the conclusion using the "traditional" method (RR).

   (b) Confirm the result in (a) by constructing a two-sided 90% confidence interval for $\mu_1 - \mu_2$ and seeing if $D_0 = 0$ is in the interval.

2. According to the Washington Post, nearly 45% of all Americans are born with brown eyes, although their eyes don't necessarily stay brown. A random sample of 80 adults found 30 with brown eyes.

   (a) Is there sufficient evidence at the $\alpha = 0.05$ level to indicate that the proportion of brown-eyed adults is less from the proportion of Americans who are born with brown eyes? Make the conclusion using the "p-value" method.

   (b) If $\alpha = 0.01$ instead, would the same conclusion be made? How about $\alpha = 0.10$? Explain.

(c) Confirm your conclusion from (b) when $\alpha = 0.10$ by constructing the appropriate one-sided 90% confidence interval for p and seeing if $p_0 = 0.45$ is in the interval.

3. To test whether a golf ball of brand A is better or worse than Brand B, 9 golfers hit a ball of each brand off the tee and measured the distance. The results for the difference in distances $(A - B)$ in yards are shown below. Assume that the paired differences in distance are approximately normally distributed.

   With $\alpha = 0.05$, test if there is a difference in average distance between brand A and brand B. Make sure to find the RR and the p-value and state any additional insights in the conclusion.

Golfer	Difference Brand A - Brand B
1	13
2	-4
3	3
4	14
5	-1
6	17
7	11
8	13
9	17

4. Some college professors and students were interested in studying a certain characteristic in Canadian geese and would like to estimate p, the proportion of birds with this characteristic.

   (a) Determine the minimum sample size needed to estimate p within $\epsilon = 0.04$ with 90% confidence.

   (b) A previous study took a random sample of 137 Canadian geese and found that 54 had this characteristic. Taking this into account, determine the minimum sample size needed to estimate the unknown p within $\epsilon = 0.04$ with 90% confidence.

5. Let X equal the tarsus length for a male grackle. Assume that the distribution of $X \sim \mathrm{N}(\mu, \sigma^2 = 4.84)$. Find the sample size n that is needed to achieve a maximum error of the estimate of

   (a) $\epsilon = 0.04$ for a 95% CI for μ

   (b) $\epsilon = 0.08$ for a 85% CI for μ