

# ICMA151 Statistics for Science I

Name: \_\_\_\_\_ ID: \_\_\_\_\_

## QUIZ 4 (5%) 5 Problems (10 points each)

### Problem

1. A random sample of  $n = 1000$  observations from a binomial population produced  $x = 728$  successes.

Estimate the binomial proportion  $p$ .

\_\_\_\_\_

Calculate the margin of error.

\_\_\_\_\_

2. Some people claim there are health benefits to eating less meat. A health club committee reported the proportion of vegetarians in their city is 0.13. Suppose this estimate was based on a random sample of 80 people. Construct a 99% confidence interval for  $p$ , the true proportion of all vegetarian eaters in this particular city.

\_\_\_\_\_

3. A stylist at The Hair Care Palace gathered data on the number of hair colorings given on Saturdays and on weekdays. Her results are listed below. Assume the two samples were independently taken from normal populations.

Saturday:  $n_1 = 50$  and  $x_1 = 14$

Weekday:  $n_2 = 65$  and  $x_2 = 13$

Find the point estimate of  $p_1 - p_2$ .

\_\_\_\_\_

Find the margin of error.

\_\_\_\_\_

Estimate the difference in the true proportions with a 99% confidence interval.

\_\_\_\_\_

Interpret this interval.

\_\_\_\_\_

4. A group in favor of freezing production of nuclear weapons believes that the proportion of individuals in favor of a nuclear freeze is greater for those who have seen the movie "The Day After" (population 1) than those who have not (population 2). In an attempt to verify this belief, random samples of size 500 are obtained from the populations of interest. Among those who had seen "The Day After", 228 were in favor of a freeze. For those who had not seen the movie, 196 favored a freeze. Test using  $\alpha = 0.05$ .

Test statistic = \_\_\_\_\_

Critical Value(s) = \_\_\_\_\_

Conclusion: \_\_\_\_\_

Interpretation: \_\_\_\_\_

5. A national survey stated that 30% of the population prefers to use a pen with black ink, 30% prefer blue ink, 25% prefer red ink and 15% prefer some other color. A statistics professor took a random sample of 80 students and asked them to state their ink color preference. The following data was recorded:

Color	Black	Blue	Red	Other
Frequency	28	26	18	8

Test whether the data agrees with the percentages stated in the national survey.

Compute the value of the test statistic.

What is  $X^2$ ?

\_\_\_\_\_

Set up the appropriate rejection region for  $\alpha = 0.05$

Reject  $H_0$  when  $X^2 > \underline{\hspace{2cm}}$ .

What is the appropriate conclusion?

We conclude that the data \_\_\_\_\_ with the national survey.