

**Math 1431**  
**Spring 2003 –Test #4**

Name \_\_\_\_\_

**You are allowed to use your calculator. Explain all answers – answers with no explanation will receive only partial credit. Use complete sentences. Show how you used the calculator to answer the questions below. For each question, note which test on TI83 you used to find the answer. Show all steps for hypothesis tests!**

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1. (10 points) A random sample of 415 potential voters was interviewed 3 weeks before the start of a state-wide campaign for governor; 223 said they favored the new candidate over the incumbent. However, the new candidate made several unfortunate remarks one week before the election. Subsequently, a new random sample of 630 potential voters showed that 307 voters favored the new candidate.

- a. Give a 90% CI for the difference in the proportions of the voters who favored the new candidate.
- b. Do these data support the conclusion that there was a decrease in voter support for the new candidate after the unfortunate remarks were made?

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2. (20 points) One part of an IQ test for young children involves building a shape with blocks. In a matched pair design, the children were given the same part of the test twice (one month apart). The data is shown below.

<b>1<sup>st</sup> trial</b>	30	19	19	23	29	78	42	20	12	39
<b>2<sup>nd</sup> trial</b>	30	6	14	8	14	52	14	22	17	8

- a. Is there evidence that there is a difference in the test results?
- b. Find the 99% CI for the data.

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3. (20 points) A study was done to determine the effectiveness of varying amounts of vitamin C in reducing the number of common colds. A survey of 450 people provided the following information (expected values in parentheses):

	Daily amount of vitamin C taken			Totals
	None	500 mg	1000 mg	
<b>No colds</b>	57 (62.22)	26 (24.44)	17 (13.33)	100
<b>At least one cold</b>	223 (217.78)	84 (85.56)	43 (46.67)	350
<b>Totals</b>	280	110	60	450

Is there evidence of a relationship between catching a cold and daily amount of vitamin C?

4. (10 points) The English mathematician John Kerrich tossed a coin 10,000 times and obtained 5067 heads.
- Is this significant evidence at the 5% level that the coin is not balanced?
  - Find a 95% confidence interval for the probability (i.e., proportion) that Kerrich's coin comes up heads.
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5. (20 points) How quickly synthetic fibers such as polyester decay in landfills? A researcher buried polyester strips in the soil for different lengths of time, then dug up the strips and measured the force required to break them. Breaking strength is easy to measure and is a good measure of decay. Lower strength means the fabric has decayed. Ten strips were buried. Five strips chosen randomly were dug up after two weeks and the rest were dug up after 16 weeks. Here are the breaking strengths in pounds:

<b>2 weeks</b>	118	126	126	120	129
<b>16 weeks</b>	124	98	110	140	110

Is there good evidence that polyester decays more in 16 weeks than in two weeks?

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**SHORT ANSWERS:**

6. (5 points) Show how to find the expected value for any one of the cells in problem #3.

7. (5 points) What is the meaning of a 95% confidence interval?

8. (5 points) List the assumptions for either the  $t$ -test OR the  $z$ -test.

9. (5 points) What is the number of degrees of freedom (df) for either the  $t$ -test OR  $\chi^2$ -test.

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**EXTRA CREDIT:**

10. (3 points): What is the formula for the chi-square statistic?