Stat 3011 Second Midterm Exam (In-Class Part)   Nov. 14, 2001

Name _____ Student ID _____

The exam is closed book. You may use a calculator, and one $8\frac{1}{2}$ by 11 sheet of paper with formulas (or anything else) on it, but no other notes. Put all of your work on this test form (use the back if necessary). Show your work or give an explanation of your answer. No credit for numbers with no indication of where they came from.

The points for the questions total to 50.

1. [10 pts.] In a clinical trial of a new arthritis drug 31% of the 200 patients in the trial reported "improved" or "much improved" quality of life when on the drug. Calculate a two standard error interval for the true unknown population proportion of patients who would have similar improvement (assuming these 200 patients are a random sample from that population). Either interval or plus-or-minus form is acceptable.

2. [15 pts.] The testing laboratory of a light bulb manufacturing plant tested a batch of 100 light bulbs from a new manufacturing process. The new light bulbs had average life time 1150 hours, and the standard deviation of their life times was 1020 hours. For comparison, 200 bulbs manufactured by the old process were also tested. For those the average life time was 1050 hours with a standard deviation of 1030 hours.

   (a) Calculate a 95% (approximate, large sample) confidence interval for the difference in true unknown population mean life times of light bulbs manufactured by the new and old processes (assuming both batches of light bulbs were random samples from the relevant populations). Either interval or plus-or-minus form is acceptable.

   (b) Same as part (a) except 90% instead of 95%.

3. [10 pts.] What is the smallest sample size for a poll that gives a 2% margin of error (that's 0.02 as a margin of error for proportions rather than percents) for 95% confidence intervals for population proportions (regardless of what the true population proportion happens to be).

4. [15 pts.] In poll about dessert preferences, some questions and answers
were

	yes	no	don't know or not sure
Generally eat dessert	71%	21%	8%
Like ice cream	77%	18%	5%
Like vanilla ice cream	68%	20%	12%

The reported margin of error of the poll was 3%.

One sixteenth (1/16) of the polled individuals consisted of children under
10 years of age. For this subgroup the answers were

	yes	no	don't know or not sure
Generally eat dessert	91%	3%	6%
Like ice cream	95%	5%	0%
Like vanilla ice cream	80%	12%	8%

Answer the questions on the next page using the "quick and dirty" or
"mental adjustment" method. For each one explain what adjustment you
are doing and why. Just the number is not a sufficient answer.

(a) What is the appropriate margin of error for the 71% eating dessert in the whole sample?

(b) What is the appropriate margin of error for the 91% eating dessert in the children under 10?

(c) What is the appropriate margin of error for the difference $77\%-68\% = 9\%$ in preference between ice cream in general and vanilla ice cream in the whole sample?

(d) What is the appropriate margin of error for the difference $95\%-80\% = 15\%$ in preference between ice cream in general and vanilla ice cream in the children under 10?