Math 4397/6397
Problem Set 10, due Thursday, Nov 19

Problem 1. In a study of the association between cigarette smoking and lung cancer, 1,357 male lung cancer patients were compared with 1,357 controls in terms of their cigarette consumption as follows:

	Cigarette Consumption Daily						
	0	$1-$	$5-$	$15-$	$25-$	$50+$	Total
Lung cancer patients	7	49	516	445	299	41	1,357
Controls	61	91	615	408	162	20	1,357

Compute the odds ratio and log odds ratio in each of the 5 smoking groups compared with non-smokers. Find confidence intervals for the odds ratios and graphically display. Comment and interpret.

Problem 2. A study of the effectiveness of *streptokinase* in the treatment of patients who have been hospitalized after myocardial infarction involves a treated and control group. In the streptokinase group, 2 of 15 patients died within 12 months. In the control group, 4 of 19 died with 12 months. Use Fisher's exact test to check whether the mortality rate of the control group is higher than the treatment group or not. Do this by hand by writing down all possible tables with fixed marginal totals. You may confirm your results with a computer.

Problem 3. This problem examines the delta method with an experiment.

a. Derive the standard error for $\sqrt{\hat{p}}$ where $\hat{p}$ is a binomial sample proportion with a large sample size.

b. Assume that $n = 200$ and $p = .5$. Implement a simulation study to verify that the delta method results in approximately normally distributed statistics.

Problem 4. **For students enrolled in Math6397 only.** In the same teams as for Project 1, work out the solution to Project 2, linked from the course webpage.