Due by 4pm on Friday, January 31. Please leave your homework on the table before class begins on Friday or leave it in the dropbox outside my office. Do not forget to attach the honor code. Each problem is worth 20 points.

- (1) In the following examples, identify the response variable and the explanatory variables.
 - (a) Attitude toward gun control (favor, oppose), Gender (female, male), Mother's education (high school, college).
 - (b) Heart disease (yes, no), Blood pressure, Cholesterol level.
 - (c) Race (white, nonwhite), Religion (Catholic, Jewish, Protestant), Vote for president (Democrat, Republican, Other), Annual income.
 - (d) Marital status (married, single, divorced, widowed), Quality of life (excellent, good, fair, poor).
- (2) Identify each variable as nominal, ordinal, or interval.
 - (a) UK political party preference (Labour, Liberal Democrat, Conservative)
 - (b) Anxiety rating (none, mild, moderate, severe, very severe)
 - (c) Patient survival (in number of months)
 - (d) Clinic location (London, Boston, Madison, Rochester, Montreal)
 - (e) Response of tumor to chemotherapy (complete elimination, partial reduction, stable, growth progression)
 - (f) Favorite grocery store for UK residents (Sainsbury, Tesco, Waitrose, other)
- (3) Each of 100 multiple-choice questions on an exam has four possible answers but one correct response. For each question, a student randomly selects one response as the answer.
 - (a) Specify the distribution of the student's number of correct answers on the exam.
 - (b) Based on the mean and standard deviation of that distribution, would it be surprising if the student made at least 50 correct responses? Explain your reasoning.
- (4) A food manufacturer uses an extruder (a machine that produces bite-size cookies and snack food) that yields revenue for the firm at a rate of \$200 per hour when in operation. However, the extruder breaks down an average of two times every day it operates. If Y denotes the number of breakdowns per day, the daily revenue generated by the machine is $R = 1600 50Y^2$. Find the expected daily revenue for the extruder.
- (5) When commercial aircraft are inspected, wing cracks are reported as nonexistent, detectable, or critical. The history of a particular fleet indicates that 70% of the planes inspected have no wing cracks, 25% have detectable wing cracks, and 5% have critical wing cracks. Five planes are randomly selected. Find the probability that
 - (a) one has a critical crack, two have detectable cracks, and two have no cracks.
 - (b) at least one plane has critical cracks.