C79 Midterm

PRINT your name: _____, _____
(last) (first)

SIGN your name: _____

Your TA's name: _____

Your section time: _____

Name of the person sitting to your left: _____

Name of the person sitting to your right: _____

Instructions: This exam is closed-notes, closed-book. You may not consult notes, textbooks, etc. Please write your answers in the spaces provided in the test. We will not grade anything on the back of an exam page unless we are clearly told on the front of the page to look there.

You have 80 minutes. There are 9 questions. The questions are of varying difficulty, so avoid spending too long on any one question. Manage your time carefully: the questions are not in order of difficulty.

Please keep your answers concise. Good luck!

Do not turn this page until your instructor tells you to do so.

Question 1		Question 6	
Question 2		Question 7	
Question 3		Question 8	
Question 4		Question 9	
Question 5		Total	

Q1. Probability.

A fair coin is to be tossed (once), and a fair die is to be rolled (once), independently.

1. What is the probability that the coin lands heads and the die lands showing 3 or more spots on top?

2. What is the probability that the number of times the coin lands heads heads plus the number of spots that show on the die is 4 or more?

Q2. BSE.

Recall Dr. Cox's probability model for how infected cattle are imported: each time an animal is to be imported, a coin is tossed. If the coin lands heads, the imported animal has BSE; if the coin lands tails, it does not. The chance of heads is the same every time, and the tosses are independent.

1. Give a good reason that tosses might be dependent for different animals, rather than independent.

2. Give a good reason that the chance of heads might not be the same for different animals.

Q3. Testing.

You are subjected to a random drug test during a summer internship, and are shocked to learn that your result was positive, since you do not use drugs. What specific information should you seek to place your result in context and support your innocence?

Q4. Data interpretation.

A local health agency enacts some policies to reduce the perinatal mortality proportion in their district (based on still births and infant deaths within the first week of life). The staff carefully collects data for births delivered (i) in hospital, and, separately, (ii) in homes, both before the enactment of the policy and two years later. From this data, they note that the perinatal mortality proportion has declined noticeably for both hospital and home deliveries and they call a press conference to announce the significant success of the new policies.

However, a graduate student, who has been studying perinatal risk factors, had collected overall perinatal mortality proportions for both time periods (before and after the policies were implemented) without regard to the location of the deliveries. She observed absolutely no overall change in the proportions comparing before and after perinatal mortality proportions. She is asked to comment by the media after the press conference and indicates that she believes the policies had no impact on perinatal mortality.

Who is right and why do you think that? Is it possible that both of their data is accurate? If so, how could that be?

Q5. Surveys.

Daniel Kahneman asked respondents the following two questions:

(1) How many dates did you have last month?
A. 0 B. 1–3 C. 3–5

(2) On a scale of 1 to 5, how happy are you these days (5 being the happiest)?
A. 1 B. 2 C. 3 D. 4 E. 5

Then, two German researchers surveyed the same population and asked the same questions, but they asked these two questions in reverse order: they asked respondents question (2), then question (1). Given what you have learned in this class, how do you think the results differed between the Kahneman order and the German order of the questions? Why?

Q6. Surveys.

A researcher asked survey respondents if they supported an bill that does not exist:

- "Do you support the Keep America Free Act (KAFA) proposed by President Obama?"
  A. yes B. no

The researcher discovered that support for this non-existent act is higher in Democratic states, such as California and New York, than Republican states, like South Carolina and Mississippi. Given what you have learned in this class, why? What can account for the results? Be as specific as possible.

Q7. Voting.

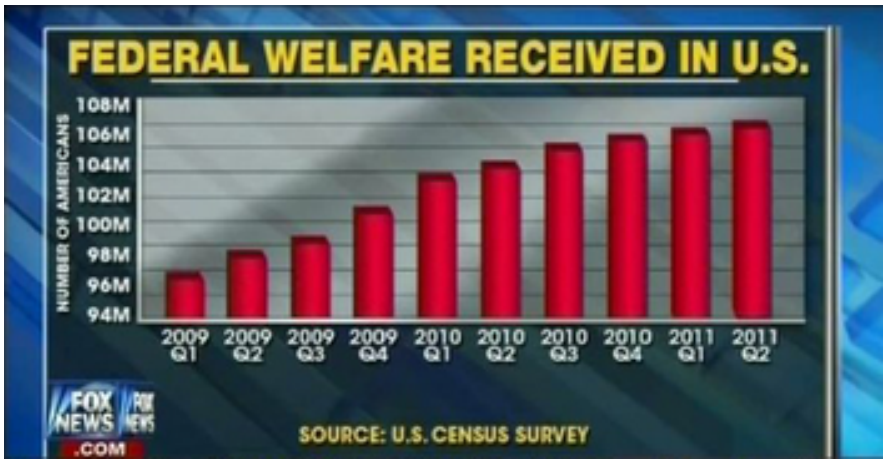
In the 2012 Presidential Election, President Obama won the majority of votes in eight of the nation's ten wealthiest counties. Does this mean that wealthier people in these counties were more likely to vote for Obama than Romney? Why?

Q8. Counting.

College A has 8 majors in the physical sciences, 10 majors in the life sciences, and 13 majors in the social sciences. Assuming you're an ambitious triple major student, how many major combinations are there if you want to avoid having all 3 majors in the same type of sciences? (You must choose exactly 3 majors.)

Q9. Counting.

Study the graph below:



Please answer the following:

1. What is the message the graph is trying to show?

2. Why might this graph be misleading?