Statistics 11 Probability Review Problems (Fall 2004, Instructor H. Xu)

1. The table below gives the results of a study of 452 individuals enrolled in a methadone-treatment program. The number of positive HIV tests and negative HIV tests are provided separately for people with different durations of intravenous drug use. Row and column totals are also provided.

	HIV Test Result		
	Tested Positive	Tested Negative	Total
Never	23	53	76
Less than 4 years	77	141	218
At least 4 years	78	80	158
Total	178	274	452

(a) What is the probability that a randomly selected subject in the program will test positively for HIV?

(b) What is the probability that a randomly selected subject in the program will have had at least 4 years of drug use and test positively for HIV?

(c) Given that a randomly selected subject has had at least 4 years of drug use, what is the probability that he/she will have a positive HIV test?

(d) Are the events "test positively for HIV" and "at least 4 years of drug use" mutually exclusive? Explain.

(e) Are the events "test positively for HIV" and "at least 4 years of drug use" independent? Explain.

2. At the California recall election, the exit polls from USA Today reported that 24% of the Democrats, 88% of the Republicans and 53% of the Independents voted yes on recall Governor Davis. The polls also reported that among of those who voted, 38% were Democrats, 39% were Republicans and 23% were Independents.

(a) Randomly select a voter, what is the probability that s/he was a Democrat and voted yes on recall?

(b) What percent of people voted yes on recall? Show your work.

(c) If a voter said that s/he voted yes on recall, what is the probability that s/he was a Democrat. Show your work.

3. Stores A, B, and C have 50, 75, and 100 employees and respectively, 15, 45, and 70 of the employees are women. None of employees works in more than one store. Randomly select a person from these 225 employees.

   (a) What is the probability that the person is a woman?

   (b) What is the probability that the person works in store B?

   (c) What is the probability that the person is a woman and works in store B?

   (d) If the person is a woman, what is the probability that she works in store B?

   (e) Are the events "the person is a woman" and "the person works in store B" independent? Explain why.

4. At the California recall election, the exit polls from USA Today reported that 43% of the females voted for Arnold Schwarzenegger. A small club has five women. Assume they voted independently on the recall election.

   (a) What is the probability that none of the five women voted for Arnold Schwarzenegger?

   (b) What is the probability that at least one of the five women voted for Arnold Schwarzenegger?

5. A string of holiday lights contains 20 lights. The lights are wired in series, so that if any light fails the whole string will go dark. Each light has probability 0.02 of failing during a 3-year period. The lights fail independently of each other. What is the probability that the string of lights will remain bright for 3 years?

6. An urn has 3 red and 4 blue balls. Choose two balls randomly from the bag without replacement.

   (a) What is the probability that the first ball is red?

   (b) What is the probability that both balls are red?

   (c) What is the probability that the first ball is red and second ball is blue?