Statistics 13V Fall 2006 NAME:____________________________________
Quiz 5 Last six digits of Student ID#:__________________

Each question is worth 10 points unless otherwise specified.

1. (5 points) If two events (both with probability greater than 0) are mutually exclusive, then:
   A. They also must be independent.
   B. They also could be independent.
   C. They cannot be independent.

2. (5 points) If two events (both with probability greater than 0) are mutually exclusive, then:
   A. They also must be complements.
   B. They also could be complements.
   C. They cannot be complements.

3. The route a student takes to school includes a stop light and train tracks. She has to wait for a train with probability 0.1, and she has to wait for a red light with probability 0.5. The student will be late if she has to wait for both. Assuming the two events are independent, what is the probability that the student is late?

   (0.1)(0.5) =).05

4. A test to detect prostate cancer in men has a *sensitivity* of 95%. This means that
   A. 95% of the men who test positive will actually have prostate cancer.
   B. 95% of the men with prostate cancer will test positive.
   C. 95% of the men who do not have prostate cancer will test negative.
   D. 95% of the men who test negative will actually not have prostate cancer.

5. Suppose that the probability of event A is 0.2 and the probability of event B is 0.4. Also, suppose that the two events are independent. Then P(A|B) is:
   A. P(A) = 0.2
   B. P(A)/P(B) = 0.2/0.4 = ½
   C. P(A) × P(B) = (0.2)(0.4) = 0.08
   D. None of the above.

6. Which of the following is an example of a relative frequency probability based on measuring a representative sample and observing relative frequencies of possible outcomes?
   A. According to the late Carl Sagan, the probability that the earth will be hit by a civilization-threatening asteroid in the next century is about 0.001.
   B. If you flip a fair coin, the probability that it lands with heads up is ½.
   C. Based on a recent Newsweek poll, the probability that a randomly selected adult in the US would say they oppose federal funding for stem cell research is about 0.37.
   D. A new airline boasts that the probability that its flights will be on time is 0.92, because 92% of all flights it has ever flown did arrive on time.

Scenario for Questions 7 to 10: In a study reported in Chapter 3 of the textbook, researchers were able to get information about voting behavior of a sample of registered voters. They knew whether or not these people voted in the November 1986 election. Seven months after the election, they surveyed these people and asked them whether or not they had voted in that election. Of those who actually *had* voted, 96% said that they did and 4% said they did not. Of those who had *not* voted, 40% claimed that they did vote and 60% admitted that they did not. Suppose these people are representative of the population of registered voters, and that in fact 50% of the population actually voted in the election.

Use the following abbreviations for events for a randomly selected person from this population:
V = voted, DV = didn't vote
S = said they voted, DS = said they did not vote

7. (**3 points each)** Give numerical values for each of the following:

A. P(V) = ________*.5*_____________

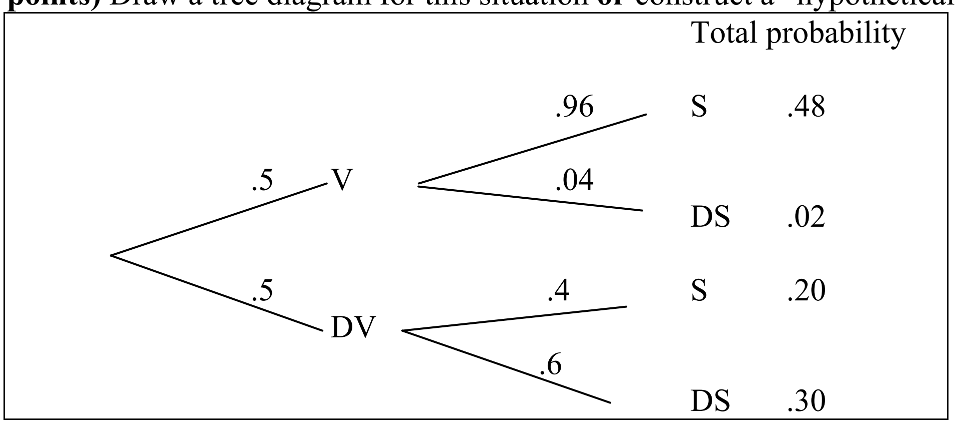
B. P(S | V) = _______*.96*____________

C. P(DS | V) = ______*.04*____________

D. P(S | DV) = ______*.4*__________

E. P(DS | DV) = _____*.6*___________

8. **(15 points)** Draw a tree diagram for this situation **or** construct a "hypothetical hundred thousand" table.



	Said they voted	Said they didn't vote	Total
Voted	48,000	2,000	50,000
Did not vote	20,000	30,000	50,000
Total	68,000	32,000	100,000

9. What is the overall probability that a randomly selected person would say they voted?

From the tree diagram, it's the sum of the probabilities for branches ending in "S" = .48 + .20 = .68.

From the table, it's the proportion in the "Said they voted" column, so it's $\frac{68{,}000}{100{,}000} = .68.$

10. Given that someone said they voted, what is the probability that they actually did vote?

From the tree diagram and probability rules, it's $P(V \mid S) = \frac{P(V \text{ and } S)}{P(S)} = \frac{.48}{.68} = .706$

From the table, it's the proportion of voters in the "Said they voted" column $= \frac{48{,}000}{68{,}000} = .706.$