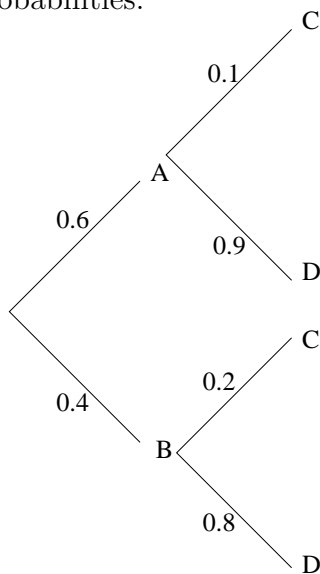


Math 141 Week-in-Review 7 Problem Set

Problems 5 and 10 are modified from *Finite Mathematics* by Long/Graening.
 Problems 8 and 9 are modified from *Finite Mathematics* by Waner/Costenoble.

1. Suppose you are a character in the movie *The Departed* as a detective in the police department. You know that in your department there are 5 leaks—people who are giving information to the mafia. There are a total of 100 people who work in your department. If you pick a group of 7 people at random to take a lie detector test, what is the probability that you will find exactly 3 of the leaks? (Assume that the lie detector is certain to find a leak.)
2. Suppose you are a character in the movie *Willy Wonka and the Chocolate Factory*. You walk into a candy store and see 300 Wonka bars on the shelves. You had a secret tip that 4 of the Golden Tickets are in this store. However, you only have enough money to buy 10 Wonka bars. What is the probability that you will get at least 1 Golden Ticket?
3. A 5-card hand is dealt from a standard deck of cards. Find the probability that
 - (a) Exactly 2 of the cards are 10's and exactly 1 of the cards is a 9.
 - (b) Exactly 1 card is a spade or exactly 3 cards are hearts.
 - (c) At least 1 card is an ace.
4. In order to use an ATM, you must have a 4-digit pin number. Suppose that to pick your pin, you number pieces of paper from 0 through 9 and place them in a bag. Then you draw 4 pieces of paper from the bag in succession with replacement. The first number drawn becomes the first digit of your pin, the second number drawn becomes the second digit, etc. What is the probability that your pin number will have exactly two 7's in it?
5. In a box are 4 pieces of paper numbered 1 through 4. An experiment consists of pulling two slips of paper out of the box in succession without replacement. What is the probability that
 - (a) One of the numbers is a 2 given that the sum of the two numbers is less than or equal to 4?
 - (b) The sum of the two numbers is 5, given that the first number drawn is a 4 or a 3?
6. Use the tree diagram to find the required probabilities.

- (a) $P(C|B)$
- (b) $P(A \cap D)$
- (c) $P(D)$
- (d) $P(B \cup D)$
- (e) $P(A|C)$



7. Suppose for two events A and B that $P(A) = 0.3$ and $P(B^c) = 0.8$. If it is known that A and B are independent events, what is $P(A^c \cap B^c)$?
8. The following table gives data of US employment figures in February of 2005. All numbers are rounded to the nearest million. (Source: Bureau of Labor Statistics)

	Employed	Unemployed	Not in Labor Force	Total
Less than High School Diploma	12	1	16	29
High School Diploma Only	36	2	22	60
Some College or Associates Degree	33	2	13	48
Bachelor's Degree or Higher	40	1	11	52
Total	121	6	62	189

- (a) Find the probability that a person was employed, given that they had a bachelor's degree or higher.
- (b) Find the probability that a person was not in the labor force, given that they had less than a high school diploma.
- (c) Find the probability that a person who was unemployed had a high school diploma only.
- (d) Are the events "having some college or associate's degree" and "not being in the labor force" independent events?
9. A certain university in Texas admitted 35% of the applicants from Texas, 15% of the applicants from other U.S. states, and 11% of international applicants. There were a total of 10000 applicants to this university. 7200 were from Texas, 2000 were from other U.S. states, and 800 were international applicants.
- (a) What is the probability that an applicant is from Texas and is admitted to the university?
- (b) What is the probability that an applicant is not admitted to the university?
- (c) What is the probability that an applicant from a U.S. state other than Texas is not admitted to the university?
- (d) What is the probability that an applicant who is admitted to the university is an international applicant?
10. During a given winter, 23% of the population received a flu shot, and of those, 1% got the flu. 12% of those who did not receive a flu shot got the flu.
- (a) What is the probability that a person got the flu?
- (b) What is the probability that a person who did not get the flu received the flu shot?
11. A medical test for a particular disease correctly indicates the presence of the disease 99% of the time among those who actually have this disease. However, 3% of the time, the medical test indicates the presence of the disease in those who do not actually have it. It is known that 5% of those who take the test actually have the disease.
- (a) What is the probability that a person actually has the disease given that the test is positive (the test says they have the disease)?
- (b) If the test comes back negative, what is the probability that the person does not have the disease?

12. I have 2 bags of marbles. Bag A has 2 red, 3 blue, and 5 green marbles. Bag B has 1 red, 3 blue, and 2 green marbles. An experiment consists of first selecting a marble from Bag A. If the first marble picked is red, it is transferred to bag B, and then a second marble is pulled from bag B. If the first marble is blue, the marble is not replaced or transferred and a second marble is picked from bag A. If the first marble is green, the marble is not replaced or transferred and a second marble is picked from bag B.
- (a) What is the probability that the first marble is red and the second marble is green?
 - (b) What is the probability that the second marble is blue given that the first marble is blue?
 - (c) What is the probability that the second marble is green.
 - (d) What is the probability that the first marble is red given that the second marble is blue?