Name:

MATH 320: In-Class 6

Answer all questions. Show your work where necessary.

1. The manufacturing company has a fabrication plant and an assembly line. The fabrication plant has 65% of the employees and the assembly line has 35%. During the past year 25% of the workers in the fabrication plant sustained injuries and 15% of the assembly line workers had injuries.

   (a) What percentage of all workers had injuries in this period? Draw a tree diagram to help.

   (b) If an employee had an injury, what is the probability that they worked on the assembly line?

2. An insurance company estimates that 40% of policyholders who have only an auto policy will renew next year and 60% of policyholders who have only a homeowners policy will renew next year. The company estimates that 80% of policyholders who have both an auto and a homeowners policy will renew next year. Company records show that 65% of policyholders have an auto policy, 50% of policyholders have a homeowners policy and 15% of policyholders have both an auto and a homeowners policy.

   (a) What percentage of policyholders will renew at least one policy next year?

   (b) What percentage of policyholders will not renew at least one policy next year?

   (c) Given that a customer renews, what is the probability they have only an auto policy?

   (d) Given that a customer does not renew, what is the probability they have only an auto policy?

3. A corporate team has three managers, M_1, M_2 and M_3, who train 50%, 30% and 20% of the employees, respectively. Further, 15% of the employees trained by M_1 make mistakes on a certain process, 22% for M_2 and 18% for M_3. Find the probability that an employee makes a mistake.

4. Consider the game of Three. You shuffle a deck of three cards: 1, 2, 3. You draw cards without replacement until your total is 3 or more. You win if your total is 3.

   Let C_i denote the event that card C is the ith card drawn. For example, 3_2 is the event that the 3 was the second card drawn. Given that you win, find the probability that the Card 3 is drawn.

5. Suppose we have two coins. We know one of the two coins is biased and comes up heads with probability 3/4, we will call this Coin 1. And we know the other coin is fair and comes up heads with probability 1/2, we will call this Coin 2. However, we don't actually know which coin is which. Suppose you pick a coin randomly and flip it.

   (a) What is the probability that the outcome of the coin flip is a head?
   HINT: Think carefully about the stages of the tree diagram.

   (b) Given that the outcome of the flip is a head, what is the probability that you picked up the biased coin?

6. The probability that a randomly chosen make has a circulation problem is 0.3. Males who have a circulation problem are twice as likely to be smokers as those who do not have a circulation problem.

   What is the conditional probability that a male has a circulation problem, given that he is a smoker?