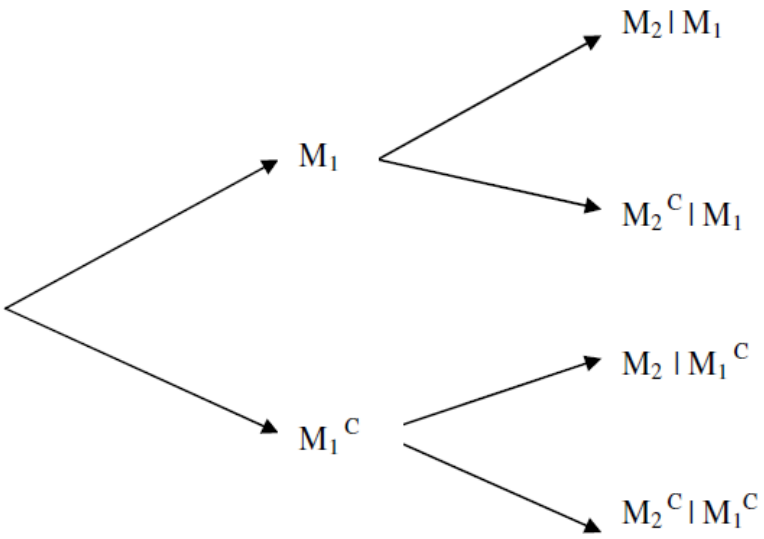
1. Suppose a basketball player with two attempts at a free throw has a 60% chance of making his first shot. If he makes the first shot, there is a 70% chance that he will make his second shot. If he misses his first shot, there is a 20% chance the he will make his second shot.

Let M_1 = he makes his first shot
Let M_1^c = he misses his first shot
Let M_2 = he makes his second shot
Let M_2^c = he misses his second shot



a. Complete the tree diagram above by adding 'weights' to the branches. (6)

b. What is the probability that he misses both shots? (4)

2. Suppose a restaurant owner wants to study the relationship between coffee and donut sales at his diner. He records orders for 100 breakfast customers. The results are below.

Let **D** = a person orders donuts
Let $\mathbf{D^c}$ = a person does not order donuts
Let **C** = a person orders coffee
Let $\mathbf{C^C}$ = a person does not order coffee

	D	$\mathbf{D^c}$
C	30	50
$\mathbf{C^c}$	15	5

a. For this sample, what is the probability that a randomly selected customer ordered a donut? (5)

b. For this sample, given that someone ordered coffee, what is the probability that they also ordered a donut? (5)

c. For this sample, are D and C independent events? Justify your answer using probabilities. (You will receive zero credit for your answer without justification.) (5)

3. The table below shows the probability distribution for the number of body piercings for STAT 201 students (based on a survey of STAT 201 students in Fall 2010).

x	P(x)
0	0.30
1	0.09
2	0.20
3	0.11
4	0.11
5	0.09
6	0.05
9	0.02
10	0.03

a. Verify that this is a valid probability distribution. (5)

c. What is the average number of body piercings for STAT 201 students? (5)

4. According to Dump and Run, Inc, the mean amount of paper thrown away by college students is 320 pounds per year. (Source: http://www.dumpandrun.org/garbage.htm) Assume this is a bell-shaped distribution with a standard deviation of 50 pounds.

a. What proportion of college students throw away less than 200 pounds of paper per year? (5)

b. What proportion of college students throw away between 300 and 400 pounds of paper per year? (5)

c. What amount of paper thrown away is at the 25^{th} percentile? ? (5)

5. In a particular class, 96% of students are right-handed. If 5 of these students are picked randomly, what is the probability that exactly 3 are right handed? (5)

6. To promote business, a local ice cream parlor mails out 150 coupons to receive a free ice cream cone on National Ice Cream Day to a random selection of local addresses. They know from past experience that when a customer receives a coupon, there is a 20% chance that the customer will redeem it (bring it in and use it.) Let X = the number of coupons that are redeemed.

a. Find the mean of X. (5)

b. Find the standard deviation of X. (5)

c. Would it be surprising if only 10 customers redeemed the coupon? Use the Empririical Rule to justify your answer. (5)