Math 132 **September 9**
Homework 1
due September 18

Instructions: Do all of the problems fully. Make sure your name is on every sheet which you turn in. You must offer explanations/justifications for your answers in order to receive credit. Feel free to work with others, but you must turn in your own homework.

1. Two students are playing a game called "Evens and Odds", where they each roll each roll one die and then multiply the numbers that turn up. Brandon gets a point if the product is even, while Melissa gets a point if the product is odd. Before they play, they are asked to come up with a sample space, and then give a probability as to who will win each point.

   (a) Brandon answers that there are only two possibilities, one being "Product is Even" and one being "Product is Odd", so that each player is equally likely to win a point. Is this reasoning correct? If not, what is wrong with it?

   (b) Melissa answers that the sample space is this:

   $(1,1)$ $(2,2)$ $(3,3)$ $(4,4)$ $(5,5)$ $(6,6)$
   $(1,2)$ $(2,3)$ $(3,4)$ $(4,5)$ $(5,6)$
   $(1,3)$ $(2,4)$ $(3,5)$ $(4,6)$
   $(1,4)$ $(2,5)$ $(3,6)$
   $(1,5)$ $(2,6)$
   $(1,6)$

   Counting up these possibilities, there are 6 combinations which give an odd product, and 15 which give an even product. Thus, the probability of Player 1 winning is $\frac{15}{21}$, or $\frac{5}{7}$, while the probability of Player 2 winning is $\frac{6}{21}$, or $\frac{2}{7}$. Is this reasoning correct? If so, explain way. If not, explain why not.

   (c) What is the probability of player 1 winning? Player 2? Create both an area model and a tree model to help explain your answer.

2. In this scenario, a person will flip a coin 4 times in a row.

   (a) What are the chances the person gets exactly 4 heads? Exactly 2 heads? At least 2 heads? Create both an area and a tree model to explain your answers to this part (note: you don't need to make a different model for each answer. One area model and tree model for all three parts would suffice).

   (b) What is more likely, getting the sequence $HTHT$ or $HHHH$?

   (c) Suppose I flip a coin 10 times. What is more likely, the sequence $HHHHHHHHHH$ or $HTHTHTHTHT$? Explain.

3. For this problem, John has a standard deck of cards, and will randomly pull a card from the deck. The standard sample space would be:

2♠	2♣	2♢	2♡
3♠	3♣	3♢	3♡
4♠	4♣	4♢	4♡
5♠	5♣	5♢	5♡
6♠	6♣	6♢	6♡
7♠	7♣	7♢	7♡
8♠	8♣	8♢	8♡
9♠	9♣	9♢	9♡
10♠	10♣	10♢	10♡
J♠	J♣	J♢	J♡
Q♠	Q♣	Q♢	Q♡
K♠	K♣	K♢	K♡
A♠	A♣	A♢	A♡

   (a) What is the probability of pulling a ♠? Answer this by creating a sample space DIFFERENT from the one above.

   (b) What is the probability of pulling an Ace? Again, do this by creating a sample space different from the one above.

   (c) What is the probability of pulling the Ace of Spades. Creating both an area model and a tree model to explain your answer.