Worksheet 01

1. We will give more formal definitions later, but for now define a probability of an event to be a number between 0 and 1 that indicates how likely an event would be to happen. For example, a value of 0 indicates that it will never happen, a value of 1 that it will always happen. This matches the way that the word 'probability' is colloquial used in a non-technical context. While in casual conversatoin most people refer to the number as a percentage or fraction, it will be good to start thinking of them as decimals. Given this, give approximate values for the probability of the following events:

(a) A randomly selected M&M will be blue.
(b) A randomly selected car in Virginia is electric.
(c) A randomly selected book starts with the word 'The'.
(d) An NBA basketball player will make a free throw.
(e) A pregnancy results in having twins.
(f) A clover will be a four-leaf clover.
(g) A letter will be lost by the U.S. postal service.
(h) Someone born in the U.S. in the year 2000 is named Taylor.

2. Many probability theory questions are described in terms of flipping a coin, with the idea that every coin flip results in the coin landing one of the two sides, which we call 'heads' (H) or 'tails' (T). A sequence of coin flips can be written as a sequence of H's and T's. Write down all possible sequences from flipping a coin twice.

3. Another common device in probability theory are dice (note that the singular is called a 'die'). The most common type of die are six-sided, but theoretically they can have any number of sides. We can describe a sequence of die flips as a sequence of numbers. What would be equivalent to a 2-sided die?

4. Finally, another common device in probability theory is a deck of cards. In this class we will consider a simplified but generalized version of a standard card deck. Each card in our decks will have a suit/color and a number; there will be C suits, with one card of each suit for every integer from 1 to N. What would be the values of C and N that reproduce the standard 52-card deck of poker cards?

5. Write the sum of the square integers from 1 to N using a summation symbol.

6. Find the derivative of $x^2 e^x$.

7. Find the definite integral of xe^{x^2} from 0 to 1.

8. What is the value of $log_2(16)$? Do not use a calculator.