MTH 2300 – Chapter 6 Problems

These problems will not be collected or graded. Think of them as typical exam questions.

1. The six possible outcomes for the value of the roll of one fair die are 2, 3, 4, 5, 6, and 7. Let the random variable x be the value of the roll of one fair die.
   a. Draw the probability histogram for the roll of a die.
   b. Find \( P(2 < x < 5) \)
   c. Find \( P(2 \leq x \leq 5) \)
   d. Find the expected value and standard deviation of the roll of one fair die.

2. You know that your bus runs once every 25 minutes, but it is snowing today and you are not sure how long it has been since the last bus. But you do know that waiting times follow a UNIFORM distribution. What is the probability that you will wait:
   a. at most 5 minutes  
      Hint: It helps to
   b. between 10 and 20 minutes  
      draw a diagram.

3. Diet Coke is sold in 12 ounce cans. The amount of liquid in the can follows a normal distribution with a mean of 12.08 ounces and a standard deviation of .15 ounces. If we select one can at random, find the probability that it contains:
   a. between 11.90 and 12.10 ounces
   b. more than 12.0 ounces
   c. 14% of all the cans contain less than what amount?
   d. 9% of all the cans contain more than what amount?
   e. Suppose we measure a 120 cans (5 cases). What is the probability that their average contents will be more than 12.05 ounces?

4. The typical computer random number generator yields numbers in a \text{UNIFORM} distribution between 0 and 1 with a mean of 0.500 and a standard deviation of 0.289. (Hint: This is a continuous distribution.)
   a. What is the probability that the next \text{INDIVIDUAL} random number will be between 0.51 and 0.52?
   b. Suppose we generate 100 random numbers. What is the probability that their \text{AVERAGE} will be between 0.51 and 0.52?