Show **all** of your work on this assignment and answer each question fully in the given context.

Please staple your assignment!

1. **Chapter 5, Section 1, Exercise 1 (page 243)**

2. **Chapter 5, Section 1, Exercise 2 (page 243)**

3. **Chapter 5, Section 1, Exercise 5 (page 244)**

4. Suppose that you have two fair six-sided die (meaning each side has the same chance of facing up), one red and one blue, and suppose that each roll of the pair is independent. Define X to be the sum of the number of dots facing up on a single roll of the pair of die, and define T to be the first roll of the pair of die where the sum of the dots facing up is 7.

   (a) Complete the following table for the random variable X:

x	$f(x)$
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

   (b) If I roll the pair of die 4 times, how many times should I expect the sum of the dots facing up on the two die to be 7? What is the probability that I roll a 7 on three of those

   (c) If I roll the pair of die 6 times, what is the probability that the sum of the dots facing up on the two die will be a 7 on three of those rolls?

   (d) Find $P(T \le 5)$.

   (e) Find $P(T \ge 2)$.

   (f) How many times should I expect to roll the die before I see my first roll of 7.

5. Consider a continuously distributed random variable, W, with a probability density function given by

$$f(w) = \begin{cases} \frac{1}{5(1-e^{-2})}e^{-w/5} & 0 \le w \le 10 \\ 0 & \text{otherwise} \end{cases}$$

(a) Graph the probability density function (carefully labeling important features).

(b) Show that the function $f(w)$ is a valid probability density function (i.e., show that (i) $f(w)$ is non-negative and (ii) $\int_{-\infty}^{\infty} f(w)dw = 1$).

(c) Find $P(W \le 2)$

(d) Find $P(2 \le W \le 5)$

(e) Find $P(5 \le W \le 10)$

(f) Find $P(2 \le W \le 10)$