

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 $P(T \leq 5)$.
 - (e) Find $P(T \geq 2)$.
 - (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

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

- (a) Graph the probability density function (label important points).
- (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 $P(W \leq 2)$
- (d) Find $P(2 \leq W \leq 5)$
- (e) Find $P(5 \leq W \leq 10)$
- (f) Find $P(2 \leq W \leq 10)$