
ENGINEERING PROBABILITY

HOMEWORK # 6:
Posted on 02/28/2018

Please work out the **ten** (10) problems stated below – BT refers to the text: D.P. Bertsekas and J.N. Tsitsiklis, Introduction to Probability (Second Edition), Athena Scientific (2008). Problem **1.55** (BT) refers to Problem 55 for Chapter 1 of BT (to be found at the end of Chapter 1). **Show** work and **explain** reasoning.

1. ______

Problem **2.1** (BT)

2. ______

Problem **2.2** (BT) – A well known problem!

3. ______

Problem **2.3** (BT)

4. ______

Problem **2.6** (BT)

5. ______

Problem **2.7** (BT)

6. ______

Problem **2.13** (BT)

7. ______

Problem **2.14** (BT)

8. ______

Problem **2.15** (BT)

9. ______

With a and b integers with $a \leq b$, define the uniform pmf on the integer interval $\{a, a = 1, \ldots, b-1, b\}$ by

$$p_{a,b}(x) = \frac{1}{b-a+1}, \quad x = a, a+1, \ldots, b-1, b.$$

Give a probability triple $(\Omega, \mathcal{F}, \mathbb{P})$ and a rv $X : \Omega \to \mathbb{R}$ such that X has pmf $\{p_{a,b}(x),\ x = a, a+1, \ldots, b-1, b\}$ under $\mathbb{P}$.

10.

In this problem N is a positive integer. Consider the following experiment $\mathcal{E}$ involving Alice and Bob: Alice selects a subset A_1 (possibly empty) at random from the collection of all subsets of the set $\{1, 2, \ldots, N\}$. This takes place in Los Angeles at 12:00 noon on October 17, 2013. At exactly that moment, independently of Alice, while at lunch in New York City, Bob selects a subset A_2 (possibly empty) at random from the collection of all subsets of the set $\{N, N+1, N+2, \ldots, 2N-1\}$.

10.a. Argue for a probability model that describes this situation. Describe *explicitly* an outcome ω, the sample space Ω, the collection $\mathcal{A}$ of events and the probability assignment $\mathbb{P}$.

10.b. Compute the probability that N belongs to A_2.

10.c. Compute the probability that the sets A_1 and A_2 do not intersect.
