ENGINEERING PROBABILITY

HOMEWORK # 4:
Posted on 02/14/2018

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 **1.19** (BT)

2.

Problem **1.20** (BT)

3.

Consider N urns (with $N \geq 2$), say $U_1, \ldots, U_N$, each of which initially contains R red balls and B blue balls. Each of the urns has been well stirred and shaken! A ball is drawn at random from urn U_1, and put in urn U_2 which is then well stirred and shaken! Then, a ball is drawn at random from urn U_2 and put in urn U_3. The process is repeated until a ball is finally drawn at random from last urn U_N.

3.a. Explicitly construct a probability model to study this problem [**Hint**: Perhaps it is enough at each step to keep track of the color of the ball which was selected?].

3.b. Use this model to compute the probability that the last ball drawn is red!

4.

Problem **1.22** (BT). What is the probability model for this problem?

5.

Problem **1.27** (BT). What is the probability model for this problem?

6.

Imagine that N tickets are sold in a lottery, of which W are winning tickets. Mr. Noone buys K tickets, Assume that $W + K < N$.

6.a. Construct a probability model that would model this situation under the natural assumption that the tickets are indeed sold at random.

6.b. Use this probability model to compute the probability that Mr. Noone has bought at least one winning ticket.

6.c. With K and W fixed, what happens to this probability when N is very large?

7. _____

Problem **1.30** (BT).

8. _____

Problem **1.31** (BT).

9. _____

Problem **1.34** (BT).

10. _____

Problem **1.35** (BT).
