Introduction to Probability

Math 30530, Section 01 — Fall 2012

Homework 3 — due Friday September 14

General information: Homework is an essential part of your learning in this course, so please take it very seriously. It is extremely important that you keep up with the homework, as if you do not, you may quickly fall behind in class and find yourself at a disadvantage during exams.

You should treat the homework as a learning opportunity, rather than something you need to get out of the way. Reread and revise your solutions until they are correct and concise. This will help deepen your understanding of the material. I encourage you to talk with your colleagues about homework problems, but your final write-up must be your own work.

You should present your final homework solutions clearly and neatly. Keep in mind that when you write a homework solution, you are trying to communicate the solution to someone other than yourself, so incomplete sentences and personal shorthand is not helpful!

I plan to quickly post solutions to all the problems after I've collected them up.

Reading:

- Chapter 6
- Chapter 7
- Chapter 13 (In this chapter, ignore all comments on expected value and variance; this is something we will get to in a few days)
- Chapter 14 (Same comment as above applies here)

Problems: (**GW** indicates that the problem is taken from the course textbook by Gundlach and Ward)

1. You are in a room with five doors, and your host tells you that behind two randomly chosen doors he has placed a prize (all choices of two doors equally likely). You open the five doors, one after another, from left to right. Let X be the random variable that measures the number of doors you open *after* seeing the first prize you see, but *before* seeing the second prize.

   (a) What are the possible values that X can take on?

   (b) Compute the mass function of X, and plot it.

   (c) Plot the Cumulative Distribution Function of X.

   (d) What is the probability that X is at least 2?

2. **GW** 6.2 (for this question, as well as 6.5, 6.8, 6.10 and 6.11, you should state any assumptions you are making about the experiment, if these assumptions are important to leading you to your conclusions)

3. **GW** 6.5

4. **GW** 6.8

5. **GW** 6.10

6. **GW** 6.11

7. **GW** 6.17

8. **GW** 7.1

9. **GW** 7.4

10. **GW** 7.5

11. **GW** 7.8 (a, b only)

12. **GW** 7.10

13. **GW** 7.16 (a, b, c only)

14. **GW** 7.19 (a, b, c only)

15. For each of the random variables that appear in 7.1, 7.4, 7.5 and 7.19, say which are binomial and which are not. In those cases where the random variable is binomial, say what n and p are; in those cases where the random variable is not binomial, explain why not.

16. **GW** 13.3 (a, b, c, e only)

17. **GW** 13.12

18. **GW** 14.1 (a, b, c, d, e only)
19. **GW** 14.4
20. **GW** 14.7
21. **GW** 14.21
22. **GW** 14.26