

Week 13 Classwork/Homework Assignment

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For the assignment, you only need to turn in a completed pdf. You may need to attach a hand written document showing your work for these problems. Make sure that the compiled documents will display all the required code to get your results.

The assignment is due Tuesday November 14 at 3:30 PM.

1. Define and describe the following terms:

- probability
- frequency and relative frequency
- probability distribution function (pdf)
- probability density function (also, pdf)
- cumulative distribution function (cdf)
- conditional probability
- Bayes' Theorem
- independent events
- dependent events
- expected value
- variance
- Normal distribution (M), Poisson distribution (N), Binomial distribution (K)

2. A couple plans on having two children. What is the probability (assuming that each sex has the same probability of occurring) that the couple will have:

- one child of each sex?
- both children of the same sex?

3. The following table gives the number of AIDS deaths in 2000 for people over age 13. Use the table to find the probability that a person who died of AIDS in 2000

- is Hispanic.
- is female.
- is female or Hispanic.
- is male or black (non-Hispanic).

	white, non-hispanic	black, non-hispanic	hispanic	other	total
male	5759	6667	2674	211	15383
female	940	3278	763	81	5074

4. You have a population that has a critical population size C . You begin the population at $N_0 = C/2$. The probability of a birth or death are equal for any population size. What is the probability that the population either reaches C or goes extinct?

5. A son is practicing tennis with his coach and father. The father makes a bet that the son cannot consecutively win two matches in a row in a three match set. In these sets the son cannot play against the same person twice since the father and coach need to rest between matches. The son knows he has

a better chance of beating his dad than he does the coach. What order should he play against them to optimize his chances of winning?

6. Smith has two children. You meet Smith and a child who is a boy. What is the probability that the second child is a boy?

John proposes that before meeting the first child, the possible events in Smith's family are $\{GG, GB, BG, BB\}$, where G represents a girl and B represents a boy. Since we met a boy this eliminates the possibility of GG from Smith's children. This leaves the possible events as $\{GB, BG, BB\}$. Assuming each family mix has the same probability, the probability that the second child is a boy is $\frac{1}{3}$.

Is his reasoning correct? Explain.

7. Suppose you're on a game show, and you're given the choice of three doors. Behind one door is a car and behind the others are goats. You pick a door (let's say door 1), and the host, who knows what's behind the doors, opens the door (say door 3), which has a goat. He then says to you, "Do you want to pick door 2?" Is it to your advantage to switch your choice?