

Maths 4255
Spring 2009
Take-Home Assignment # 2
Due Date: In-Class on 02/12/2009

Instructions: Your solutions must appear in an organized and legible format to be given full consideration.

1. (**chap 3, ex5, Problems**): An urn contains 6 white and 9 black balls. If 4 balls are to be randomly selected without replacement, what is the probability that the first 2 selected are white and the last 2 black?
2. (**chap 3, ex26, Problems**): Suppose that 0.5 percent of men and 0.25 percent of women are colorblind. A colorblind person is chosen at random. What is the probability of this person being male? Assume that there are an equal number of males and females. What if the population consisted of twice as many males as females?
3. (**chap 3, ex32, Problems**): A family has j children with probability p_j , where $p_1 = 0.1$, $p_2 = 0.25$, $p_3 = 0.35$, $p_4 = 0.3$. A child from this family is randomly chosen. Given that this child is the eldest child in the family, find the conditional probability that the family has
 - (a) only 1 child
 - (b) 4 children
4. (**chap 3, ex38, Problems**): Urn A has 5 white and 7 black balls. Urn B has 3 white and 12 black balls. We flip a fair coin. If the outcome is heads, then a ball from urn A is selected, whereas if the outcome is tails, then a ball from urn B is selected. Suppose that a white ball is selected. What is the probability that the coin landed tails?
5. (**chap 3, ex14, Theoretical exercises**)(**Bonus question**): Suppose that you are gambling against an infinitely rich adversary and at each stage you either win or lose 1 unit with respective probabilities p and $1 - p$. Show that the probability that you eventually go broke is

$$\begin{cases} 1 & \text{if } p \leq 1/2 \\ \left(\frac{q}{p}\right)^i & \text{if } p > 1/2 \end{cases}$$

where $q = 1 - p$, and i is the initial fortune.