MATH 201
HOMEWORK 4
WRITTEN PROBLEMS

1. Jane has two children which were born on different dates. In the community that Jane is from (and hence you can assume this is also true for Jane) the possibilities when one has two children are $\{(b,b),(b,g),(g,b),(g,g)\}$ where the first slot is the gender of the younger child and the second slot is the gender of the older child, and these four outcomes have equal probability.

(a) What is the probability that Jane has two sons given that her oldest child is a boy?

(b) What is the probability that Jane has two sons given that one of her two children is a boy?

2. Consider 3 baskets. Basket A contains 3 white and 5 red marbles. Basket B contains 8 white and 3 red marbles. Basket C contains 4 white and 4 red marbles. An experiment consists of selecting one marble from each basket at random. What is the probability that the marble selected from basket A was white, given that exactly 2 white marbles were selected in this process.

3. Suppose we have three fair 6-sided die (one colored green, one colored black, and one colored red). An experiment consists of rolling all three die. Let G, B, and R denote the numbers rolled on the green, black and red die respectively.

(a) What is the probability that no two of these die show the same number after the roll?

(b) What is the conditional probability that $G < B < R$ given that no two dice show the same number? (Hint: You might consider using symmetry, and consider how many orderings of G, B, R are possible when they are different numbers).

(c) What is the probability that $G < B < R$ when one conducts this experiment?

4. Bag A has 4 red and 6 blue balls. Bag B has 3 red and 8 white balls. We flip a fair coin. If the outcome is heads, a ball from bag A is selected at random, but if the outcome is tails, a ball from bag B is selected at random. Given that a red ball is selected, waht is the probability that the coin flip came up tails?