

Math 180 Homework #2
Due Wednesday, September 19

1. A jar contains six marbles, described as follows. Three of the marbles are colored blue, and labeled “1”, “2” and “3”, respectively. Two of the marbles are colored red and labeled “1” and “2”, respectively. The last marble is colored green and labelled “1”. Suppose you randomly pull a marble from the jar.
 - (a) What is the sample space for this experiment? (Explain any special notation that you use.)
 - (b) Let A be the event that the marble you select shows the number 2. Let B be the event the marble you select is colored blue. Calculate the following probabilities:
 - i. $P(A)$
 - ii. $P(B)$
 - iii. $P(A \cup B)$
 - iv. $P(A \cap B)$
 - v. $P(A^c)$
 - (c) Are A and B mutually exclusive?
2. You play a game with a friend in which, on the count of three, you each stick out (at random) one, two, three, four, or five fingers. If the total number of fingers showing (yours plus the friends) is an odd number, you win. If the total is even, they win. Is this game fair? (That is, do you and your friend each have a probability of 0.5 of winning?) Explain.
3. At a high school, suppose that 6% of all students play both soccer and basketball, and 20% of all students play basketball. Suppose you select a basketball player at random. What are the chances that they play soccer as well?
4. Recall the Inclusion-Exclusion rule: for any events A and B ,
$$P(A \cup B) = P(A) + P(B) - P(A \cap B).$$
 - (a) Find an Inclusion-Exclusion rule for computing $P(A \cup B \cup C)$. Briefly explain why your rule works.
 - (b) Suppose you roll three dice. What is the probability that one of the die lands on 1?