

Homework 1 – Due July 3, 2012

Be sure to write your first and last name on your homework. Please write neatly and staple all pages together.

1. Let A and B be events such that $P(A \cap B) = 1/7$, $P(A^c) = 1/3$, and $P(B) = 2/7$. What is $P(A \cup B)$?
2. You roll a fair die twice. What is the probability that the first roll is higher than the second?
3. A die is rolled until the first time T that a six turns up.
 - (a) What is the probability distribution for T ?
 - (b) Find $P(T > 3)$.
4. We learned in class that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. Give a similar formula for $P(A \cup B \cup C)$. Justify your answer. (You should probably use Venn diagrams and/or the definition of probability.)
5.
 - (a) (Section 1.2, Exercise 6.) A die is loaded in such a way that the probability of each face turning up is proportional to the number of dots on that face. (For example, a six is three times as probable as a two.) What is the probability of getting an even number in one throw?
 - (b) If you have two loaded dice as in part (a) and you roll them both, what is the probability that one of them will show an even number and one of them will show an odd number?
6. If there are twelve people in a room, what is the probability that their birthdays all fall in different months? (Assume that each month is equally likely as a birth month.)
7. How many permutations of the set $\{a, b, c, d, e\}$ start with a and end with e ?
8. The numbers $1, 2, \dots, n$ are arranged in random order. Find the probability that the digits 1 and 2 appear next to each other.

Practice Problems (Do not turn in!): 1.2.1, 1.2.4, 1.2.5, 1.2.13, 1.2.18, 1.2.20, 3.1.3, 3.1.6
(Notice that the answers to the odd numbered questions are online.)