

## MATH/STAT 414 HW 2

due January 29, 2015

- (2.3) Two dice are thrown. Let  $E$  be the event that the sum of the two dice is odd, let  $F$  be the event that at least one of the dice lands on 1, and let  $G$  be the event that the sum is 5. Describe the events  $E \cap F$ ,  $E \cup F$ ,  $F \cap G$ ,  $E \cap F^c$ , and  $E \cap F \cap G$ .
- (2.4)  $A$ ,  $B$ , and  $C$  take turns flipping a coin. The first one to get a head wins.  $A$  goes first followed by  $B$ , then  $C$  and so on. The sample space of this experiment can be defined by

$$S = \{1, 01, 001, 0001, 00001, \dots\}$$

- Interpret the sample space.
  - Define the following events in terms of the sample space  $S$ :
    - $A = A \text{ wins}$
    - $B = B \text{ wins}$
    - $(A \cup B)^c$
- (2.8) Suppose that  $A$  and  $B$  are mutually exclusive events for which  $P(A) = 0.3$  and  $P(B) = 0.5$ . What is the probability that
    - either  $A$  or  $B$  occurs?
    - $A$  occurs but  $B$  does not
    - both  $A$  and  $B$  occurs
  - (2.11) A total of 28 percent of American males smoke cigarettes, 7 percent smoke cigars, and 5 percent smoke both cigars and cigarettes.
    - What percentage of males smokes neither cigars nor cigarettes?
    - What percentage smokes cigars but not cigarettes?

5. (2.12) An elementary school is offering 3 language classes: one in Spanish, one in French, and one in German. The classes are open to any of the 100 students in the school. There are 28 students in the Spanish class, 26 in the French class, 16 in the German class. There are 12 students who are in both Spanish and French, 4 who are in both Spanish and German, and 6 who are in both French and German. In addition there are 2 students taking all 3 classes.
  - (a) If a student is chosen randomly, what is the probability that he/she is not in any of the language classes?
  - (b) If a student is chosen randomly, what is the probability that he or she is taking exactly one language class?
  - (c) If 2 students are chosen randomly, what is the probability that at least one is taking a language class?
  
6. (2.16) Poker dice is played by simultaneously rolling 5 dice. Show that
  - (a)  $P(\text{no two alike}) = 0.0926$
  - (b)  $P(\text{one pair}) = 0.4630$
  - (c)  $P(\text{two pair}) = 0.2315$
  - (d)  $P(\text{three alike}) = 0.1543$
  - (e)  $P(\text{full house}) = 0.0386$
  - (f)  $P(\text{four alike}) = 0.0193$
  - (g)  $P(\text{five alike}) = 0.0008$ .
  
7. (2.25) If two dice are rolled, what is the probability that the sum of the upturned faces equals  $i$ ? Find this for any possible value of  $i$ .
  
8. (2.36) Two cards are chosen at random from a deck of 52 playing cards. What is the probability that the
  - (a) are both aces?
  - (b) have the same value?
  
9. (2.41) If a die is rolled 4 times, what is the probability that 6 comes up at least once?
  
10. (2.42) Two dice are thrown  $n$  times in succession. Compute the probability that double 6 appears at least once. How large need  $n$  be to make the probability at least  $1/2$ .