Homework 8 Chapter 14 (Problems 1 to 9)

Due on April 2

Math 125 *Kovitz* Spring 2025

Problem 6 shows alternative methods, problem 8 (b) is an extreme challenge problem; but the key problems are 1, 2 (f), 2 (h), 3 (e), 4, 5, 7, 8 (a), and 9 (a).

1. The unconditional probability of event A is 1/5. The unconditional probability of event B is 3/4.

   (a) Assuming that A and B are independent, find the chance that both happen.

   (b) Assuming that A and B are mutually exclusive, find the chance that neither happens.

2. A die is rolled four times. What is the chance that—

   (a) none of the rolls show 3 or more spots?

   (b) all the rolls show 3 or more spots?

   (c) none of the rolls show 2 spots or less?

   (d) all the rolls show 2 spots or less?

   (e) not all the rolls show 3 or more spots?

   (f) at least one roll shows 2 spots or less?

   (g) not all the rolls show 2 spots or less?

   (h) at least one roll shows 3 or more spots?

   Which two of the above 8 outcomes have the highest probability?

3. A standard deck of cards contains 52 cards, 40 numeric cards, and 12 picture cards. (A numeric card is an ace or a numbered card: A,2,3,4,5,6,7,8,9 or 10.)

   Two draws are made at random with replacement from such a deck.

   (a) What is the chance of getting a picture card on the first draw?

   (b) What is the chance of getting a picture card on the second draw?

   (c) What is the chance of getting a picture card on the first draw and a picture card on the second draw?

   (d) What is the chance of not getting a numeric card in the two draws?

   (e) What is the chance of getting a numeric card at least once in the two draws?

4. Two dice will be rolled. The chance that the first one lands with one spot up is 1/6. The chance that the second one lands with two spots up is 1/6.

   True or false: the chance that the first one lands with one spot up or the second one lands with two spots up equals $1/6 + 1/6$. Explain briefly.

5. Each question on a multiple-choice test has five possible responses, only one of which is correct. A student answers four questions by guessing at random.

   (a) True or false and explain.
   The chance that he gets at least one question correct is $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}$.

   (b) If false, calculate the correct chance, rounded off to the nearest 1%.

6. The unconditional probability of event A is 1/2, the unconditional probability of event B is 1/3, and A and B are independent.

   The chance that at least one of A or B happens must be equal to ___.

   Note: There are multiple correct methods. It is possible that more than one letter details a correct solution.

   (A) $1/2 + 1/3 = 5/6$.

   (B) $1 - (1 - 1/2)(1 - 1/3) = 1 - (1/2 \times 2/3) = 1 - 1/3 = 2/3$.

   (C) $1/2 + 1/3 - (1/2 \times 1/3) = 5/6 - 1/6 = 2/3$.

   (D) $1/2 + (1/2)(1/3) = 1/2 + 1/6 = 2/3$.

   (E) $1/2 \times 1/3 = 1/6$.

   (F) 1.

7. A die is rolled 7 times. What is the chance of getting at least one five?

8. A box contains six balls: one red and five yellow. Two draws will be made at random from the box without replacement.

   (a) Find the chance of drawing the red ball on the second draw or the red ball on the first draw.

   (b) Find the chance of drawing the yellow ball on the second draw or the red ball on the first draw.

9. Two draws are going to be made at random from the box $\boxed{\boxed{1}\ \boxed{1}\ \boxed{2}\ \boxed{2}\ \boxed{2}}$.

   Find the chance that the $\boxed{1}$ is drawn at least once

   (a) if the draws are made with replacement.

   (b) if the draws are made without replacement.