Problem Set #2

Answer 10 of the following 13 questions.

1. There are four blue balls, three red balls, three yellow balls, and two green ball in a basket.
   a. With your eyes closed, you reach into the basket and choose a single ball. What is the probability
      that it is blue?
   b. Now instead you choose balls and replace them until a red ball appears. What is the probability
      a red ball appears for the first time on the 10th draw?
   c. Now you choose balls and replace them until a red or yellow ball is chosen. What is the probability
      that neither a red nor a yellow ball will be chose in 25 draws?

2. You play a game of cards with a friend. From a well-shuffled standard pack of 52 cards, he deals
   each of you five cards.
   a. What is the probability that all your five cards are of the same suit? (There are 4 suits with 13
      cards in each suit).
   b. You pick up two of your cards and find that they are both spades. What is the conditional
      probability that all your five cards are of the same suit?

3. The PP soccer team plays 20 games in a season. In each game they have a ½ probability of
   winning, a 1/3 probability of losing, and a 1/6 probability of tying. Games are independent. What
   is the probability that the team will end the season with an 8-11-1 record (8 wins, 11 losses, and 1
   tie)?

4. A bundle of 40 Pitzer t-shirts are delivered to Huntley Bookstore. They randomly select 4 t-
   shirts for inspection. If none or one is defective, the bundle is accepted. If two or more are
   defective, the bundle is rejected. What is the probability that the bundle will be rejected if only 4
   of the 40 t-shirts are defective?

5. A Perris Valley sky-diving instructor can take 3 students at a time for a single jump. Students
   are only allowed one jump per day. One morning, 15 students show up at his office for sky-diving
   lessons.
   a. In how many ways can the instructor choose his 3 students for the first jump of the day?
   b. In how many ways can the instructor choose his 3 students for the third jump of the day?
   c. Among the 15 students, there is a couple and 13 singles. Given that the couple insists on being
      selected together (if not they would rather not jump), in how many ways can the instructor choose
      his 3 students for the first jump?

6. Marie is getting married tomorrow, at an outdoor ceremony in the desert. In recent years, it has
   rained only 5 days each year. Unfortunately, the weatherman has predicted rain for tomorrow.
   When it actually rains, the weatherman correctly forecasts rain 90% of the time. When it doesn't
   rain, he incorrectly forecasts rain 10% of the time. What is the probability that it will rain on the
   day of Marie's wedding?
7. Plácido, José, and Luciano like to sing in the shower. Plácido sings in tune 90% of the time, José sings in tune 85% of the time, and Luciano sings in tune 75% of the time. They all take a shower once a day, but never together. Someone just butchered “O Sole Mio.” What is the probability that it was Luciano?

8. In the lottery game FANTASY 5 you have to select 5 numbers from the numbers \{1,2,3,...,38,39\} for a jackpot of $109,000. Each ticket costs $1. In this lottery each number must be different and the order of the numbers does not matter.
   a. What is the expected value of this game?
   b. A fair game has an expected value of 0. How large does the jackpot have to be for Fantasy Five to be a fair game?

9. Suppose that Roeper gives movies a “thumbs up” 65% of the time, and Ebert and Roeper give movies “two thumbs up” 40% of the time. If Roeper gives a movie a “thumbs up”, what is the probability that Ebert gave the movie a “thumbs up”?

10. Suppose that 71% of Pitzer student graduate in four years, and 81% graduate in six years. If you randomly select 10 first year Pitzer students, what is the probability that all 10 will graduate in four years? in six years?

11. Suppose Huntley Bookstore has a stock of 40 Samsung ATIV Book 9 Plus laptop computers of which 12 are defective because of faulty capacitors. You and your roommate just purchased two of these laptop computers. What is the probability that both of your computers are defective?

12. An investment will be worth $1,500, $3,000, or $5,000 at the end of the year. The probabilities of these values are 0.25, 0.65, and 0.10, respectively. Determine the mean and the variance of the worth of the investment.

13. You want to fly from LAX to Denver for an important meeting. There is a 20% chance that the direct flight from LAX to Denver will be canceled. There is a 25% chance that the flight from LAX to Phoenix will be canceled. And there is a 30% chance that the flight from Phoenix to Denver will be canceled. What is the probability that you will be able to get to Denver?

Due Wednesday 14 February

Extra credit: What is the expected value of KENO (Power Play Twenty)? See the details of the game on the course web page. You may want to do this in Excel.