Please explain all of your solutions using complete sentences.

1. An elevator starts at the basement with 8 people (not including the elevator operator), and discharges them all by the time it reaches the top floor, number 6. (No restrictions on the number of people exiting the elevator at any floor.)

   (a) In how many ways could the operator have perceived the people leaving the elevator if all people look alike to him?
   
   (b) What if the 8 people consisted of 5 men and 3 women, and the operator could tell a man from a woman?
   
   (c) What if the operator is very observing and all people look different to him?

2. An urn contains $n > 0$ red and $m > 0$ black balls.

   (a) If two balls are randomly withdrawn, what is the probability that they are the same color?
   
   (b) If a ball is randomly withdrawn and then returned to the urn before the second one is drawn, what is the probability that the withdrawn balls are the same color?

3. A pair of fair dice, one of them red and the other blue, is rolled. Calculate the probability that the blue die lands on a higher value than does the red one. (The dice are fair.)

4. A small village consists of 20 families, of which 4 have one child, 8 have two children, 5 have three children, 2 have four children, and 1 has five children. If one of these families is chosen at random, what is the probability that it has $i$ children, for $i = 1, 2, 3, 4, 5$?

5. An urn contains 3 red and 7 black balls. Players A and B withdraw balls from the urn consecutively (A draws first, then B, then A, then B, etc.) without replacement until a red ball is selected. The first player who selects a red ball wins the game. Find the probability that player A wins.