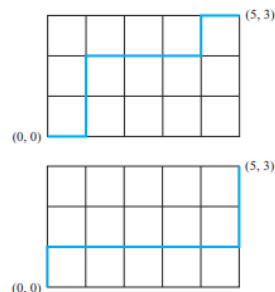


1. How many license plates can be made if each plate contains two different letters followed by three different digits.
  - a. Solve the problem if first digit cannot be 0.
2. There are 6 roads between A to B and 5 roads between B to C. Find the number of ways that one can drive:
  - a. From A to C via B
  - b. Round trip from A to C via B
  - c. Round trip from A to C via B without using the same road more than once.
3. How many strings of eight English letters are there
  - a. That contains no vowels, if letters can be repeated?
  - b. That contains no vowels, if letters cannot be repeated?
  - c. That starts with the vowel, if letters can be repeated?
  - d. That starts with the vowel, if letters cannot be repeated?
  - e. That contain at least one vowel, if letter can be repeated?
  - f. That contain at least one vowel, if letter cannot be repeated?
  - g. That starts with X and contain at least one vowel, if letters can be repeated?
  - h. That starts with X and contain at least one vowel, if letters cannot be repeated?
4. How many bit strings of length 8 contain either three consecutive zeros or four consecutive 1s?
5. Use a tree diagram to find the number of ways the world series can occur, where the first team that wins four games out of seven wins the series.
6. How many permutations of letters ABCDEFGH contain
  - a. The string BCD?
  - b. The string CFGA?
  - c. The strings BA and GF?
  - d. The strings AB, DE, and GH?
  - e. The strings CAB and BED?
  - f. The strings BCA and ABF?
  - g. The strings BCA and GAE?
7. How many ways are there for 8 men and 5 women to stand in a line so that no two women stand next to each other?
8. How many bit strings of length 10 contain at least three 1s and at least three 0s?
9. Find the coefficient of  $x^8y^9$  in the expansion of  $(3x - 2y)^{17}$ .
10. Count the number of paths in the XY-plane between the origin (0,0) and point (m, n) such that each path is made up of a series of steps where each step is a move one unit to the right or a move one unit upward (no moves to the left or downward are allowed) two such a path from (0, 0) to (5, 3) are illustrated here



- a. Show that each path of the type describe can be represented by a bit string consisting of  $m$  0s and  $n$  1s where a 0 represent a move one unit to the right and a 1 represents a move one unit upward.
  - b. Conclude from part (a) that there are  $\binom{m+n}{n}$  paths of the desired type.
11. One hundred ticket numbered 1,2,3...100, are sold to 100 different people for a drawing. Four different prizes are awarded, including a grant prize. How many ways are there to award the prizes if
  - a. There are no restrictions?
  - b. Person holding ticket 47 wins the grand prize?
  - c. The person holing 47 wins one of the prizes?
  - d. The person holding ticket 47 does not win a prize?
  - e. The people holding tickets 19, 47 both win prizes?
  - f. The people holding tickets 19, 47, and 73 all win prizes?
  - g. The people holding tickets 19, 47, 73 and 97 all win prizes?
  - h. None of the people holding tickets 19, 47, and 73 wins a prize?
  - i. The grand prize winner is a person holding ticket 19, 47, 73, or 97?
  - j. The people holding tickets 19, 47 win prizes but the people holding tickets 73 and 97 do not win prizes?
12. What is the coefficient of  $x^{14}y^{17}$  in the expansion of  $(3x - 2y)^{31}$ ?
13. Show that if  $n$  and  $k$  are positive integers  $0 \leq k \leq n$  then  $\binom{n}{k} \leq 2^n$ .