

First Name: \_\_\_\_\_ Last Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

**Test 1 ( / 50)**

Please show work and explain your answers clearly. You risk losing marks otherwise.

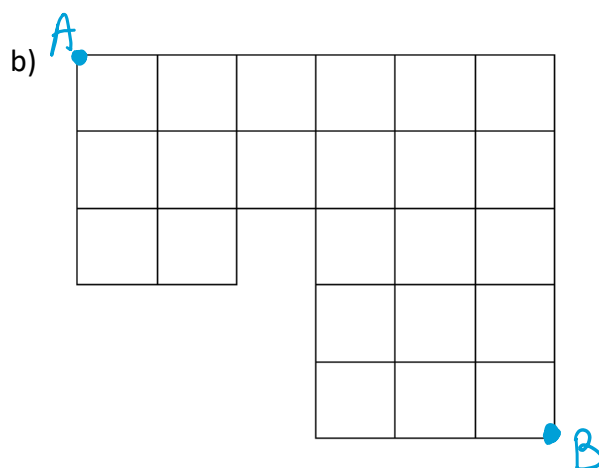
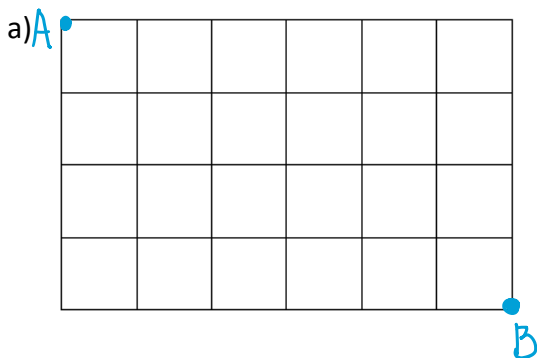
1.
  - a) How many 7-digit numbers are there? (3 marks)
  - b) How many 7-digit numbers are there that include the digit 6 and exclude the digits 1 and 5? (3 marks)
  
  
  
  
  
  
  
  
  
  
2. (6 marks) Find the number of ways arranging the letters of STATISTICS if:
  - a) there are no restrictions
  - b) the first letter must be C
  - c) the odd-numbered positions must remain unchanged
  - d) the letters A and C must be separated

3. (6 marks) Solve the following for  $n$ ,  $n \in W$ .

a)  $30(n - 2)! = n !$

b)  $P(n, 2) = 72$

4. (4 marks) Determine the number of possible routes from  $A$  to  $B$  if one can only travel south or east:



6. (3 marks) John finds 9 shirts in his size at a clearance sale. How many different purchases could he make?

7. (4 marks) There are 350 farmers in a large region. 260 farm beetroot, 100 farm yams, 70 farm radish, 40 farm beetroot and radish, 40 farm yams and radish, and 30 farm beetroot and yams. Determine the number of farmers that farm beetroot, yams, and radish. Assume each farm farms at least one of the three types of produce.
8. (4 marks) A school dance committee has 14 volunteers. Each dance requires 3 volunteers at the door, 5 volunteers on the floor, and 6 floaters. If two of the volunteers, Christine and Samuel, can not work together since they are new. In how many ways can the volunteers be assigned?
9. (3 marks) If  $\sum_{r=0}^n C(n, r)(-4)^r = 81$ , find  $n$ .

10. (4 marks) In the expansion of  $(x - 2)^5(1 + \frac{1}{x})^2$ , determine the coefficient of the term containing  $x^2$ .

11. (5 marks) What is the odds against not flipping two heads in a row when a coin is tossed five times?

12. (5 marks) A die is thrown twice. What is the probability that the sum of the rolls is divisible by 2 **given that** a) exactly one of the rolls is a 3? b) the second roll is a 3?