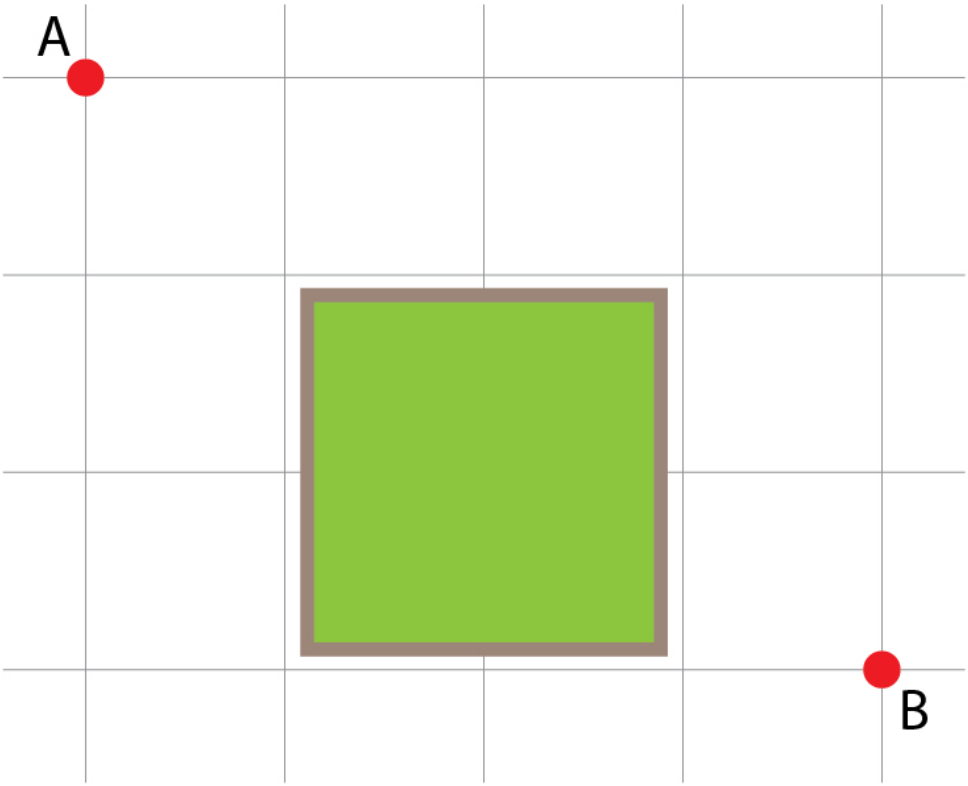
Problem #1

Find the number of different shortest paths from point A to point B in a city with perfectly horizontal streets and vertical avenues as shown in Figure. No path can cross the fenced off area shown in grey in the figure.



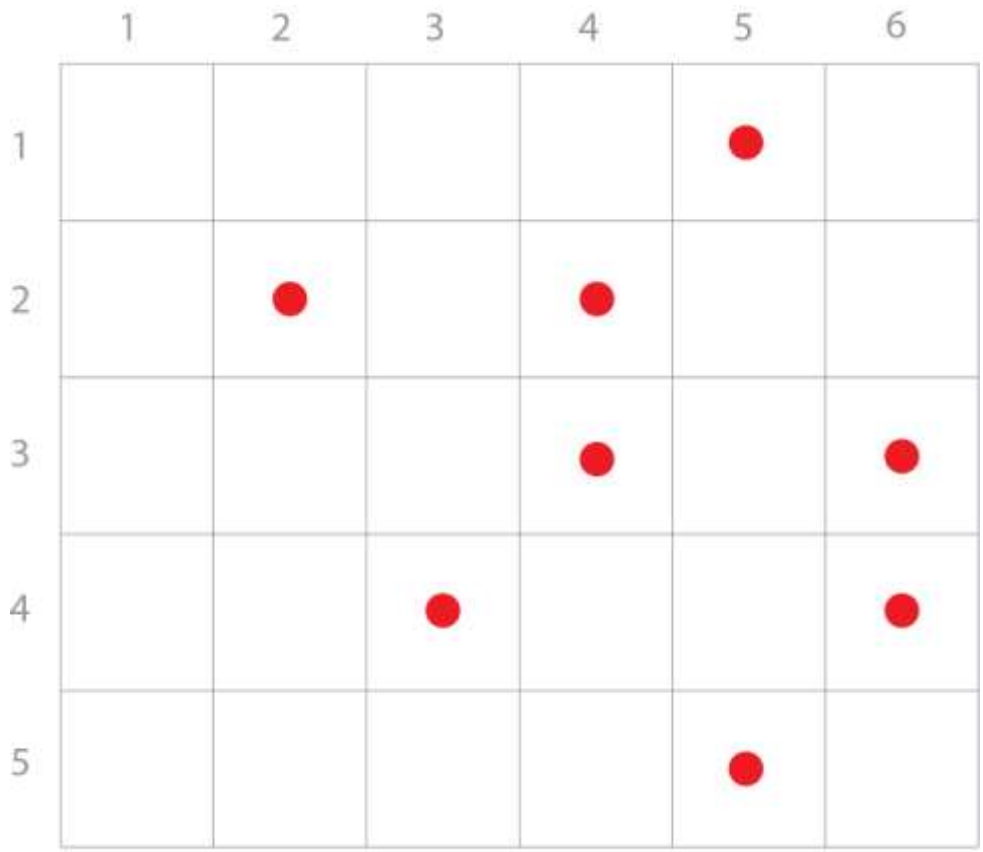
Maximum Sum Descent

Some positive integers are aranged in a triangle like the one shown below. Design an algorithm (more efficient that an exhaustive search) to find the largest sum in a descent from its apex to the base through a sequence of adjacent numbers, one number per each level.

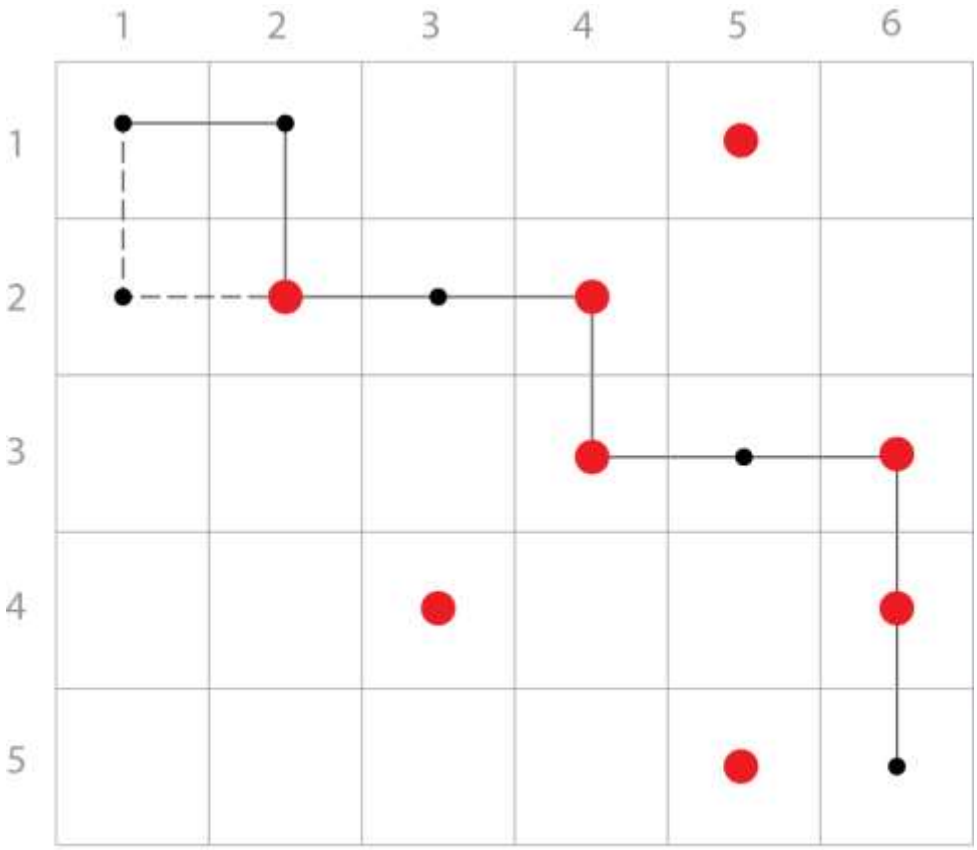
```
          2
        5   4
      3   4   7
    1   6   9   6
```

Picking Up Coins

Some coins are spread in cells of an ***n x m*** board, one coin per cell. A robot, located in the upper left cell of the board, needs to collect as many of the coins as possible and bring them to the bottom right cell. On each step, the robot can move either one cell to the right or one cell down from its current location. When the robot visits a cell with a coin, it picks up that coin. Devise an algorithm to find the maximum number of coins the robot can collect and a path it needs to follow to do this.



(a) Coins given.



(c) Two paths to collect 5 coins, the maximum number of coins possible