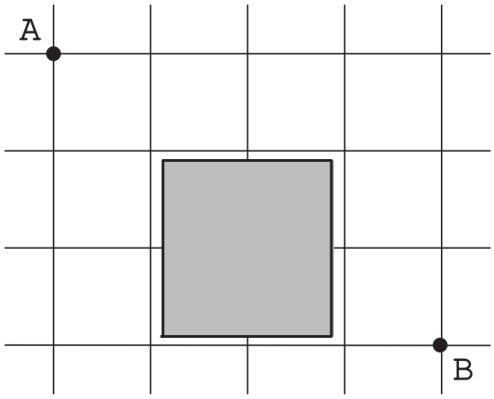
Ain Shams University
Faculty of Engineering
Computer Engineering and Software Systems

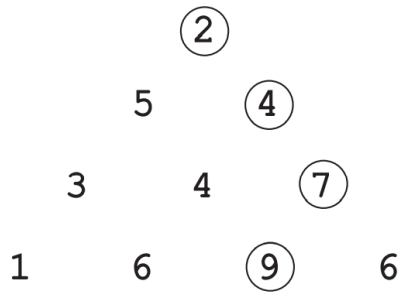
CSE 332: Design and Analysis of Algorithms – Spring 2023

Lab 5

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.



2- Some positive integers are arranged in a triangle like the one shown in Figure. Design an algorithm (more efficient than an exhaustive search, of course) 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.



3- Some coins are spread in the cells of an n × 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.