# Coding Assignment - MTS Systems

## Landscape

You are given a two-dimensional grid of points of size X by Y, having X-points along the x-axis, and Y points along the y-axis. Additionally, each point has a z-coordinate along the z-axis. Together, all points in the grid represent a landscape. Two points A and B (A != B) are ***adjacent*** on the landscape if they are neighbors on the grid, i.e. abs(Ax - Bx) == 1 and Ay=By, OR Ax=Bx and abs(Ay - By) == 1 (regardless of their **z** values). A ***path*** is defined as a sequence of points in the landscape where any two consecutive points in the sequence are adjacent in the landscape.

**Question (1)**

Find all the *lakes* in the landscape. A lake is a set of points whose "z" values are all below a given threshold **W** (think "water level"), and any two points in the lake are connected by at least one path where each point in the path is also below **W**.

**Question (2)**

2.1 Find the lake with the largest “surface area” at the top. Surface area is the two-dimensional area of water at water level W (top of the lake).

2.2 Find the lake with the largest volume of water.

Minor approximation is acceptable when computing surface area and volume.

**Question (3)**

Given two points, A and B, chart the shortest ***motorable*** path between points A and B. A motorable path is defined as a path where, between any two consecutive points, the ***gradient*** should be less than a given threshold ***G***. Gradient between 2 adjacent points is defined as the absolute difference between their z values.

**Deliverables:**

* Code in any language that we can run and verify that it works
* Tests that we can run and verify that it works

***We emphasize code hygiene, modularization, documentation and test coverage. We look for efficiency of implementations.***

*You may send your questions to* [*takehome@thoughtspot.com*](mailto:takehome@thoughtspot.com)*.*