The Travelling Salesman Problem

- ✓ Code up the solution to travelling salesman problem.

- ✓ Identify a set of cities (up to 10) with a grid framework along x and y coordinates.

- ✓ The distance between cities can be calculated using Pythagoras.

- ✓ Solve the problem using brute force (ie try every combination)

- ✓ Solve the problem using an Heuristic algorithm: Use the greedy algorithm, that is you visit the next nearest city.

- ✓ Return the order of cities you wish to visit and the overall final distance.

- ✓ Plot the route using mapplotlib

Greedy algorithm

1. Find the distance to all unvisited cities
2. Travel to the next nearest city
3. Repeat steps 1 and 2 until all cities have been visited

Calculating the distance between cities

To calculate the distance between the two cities, we use Euclidian geometry

$$city1 = (x1, y1)$$
$$city2 = (x2, y2)$$
$$Distance = \sqrt{(x1 - x2)^2 + (y1 - y2)^2}$$

Example

	1	2	3	4	5	6	7	8
1								
2								
3		■						
4								
5						■		
6								
7								

$$City1 = (2,3)$$
$$City2 = (6,5)$$
$$Distance = \sqrt{(2 - 6)^2 + (3 - 5)^2}$$
$$Distance = \sqrt{20}$$

Extension 1

Use a GUI

Extension 2

Use another Heuristic algorithm, The genetic algorithm is a great one, but you will need to do a bit of research.

Extension 3

Use OOP