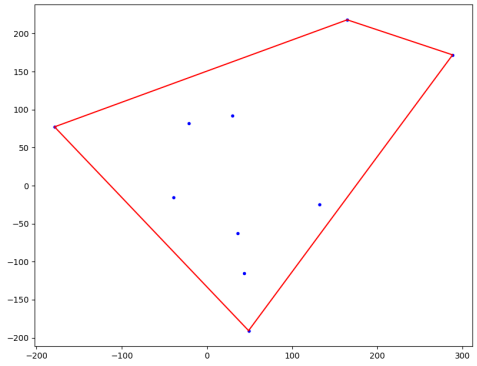
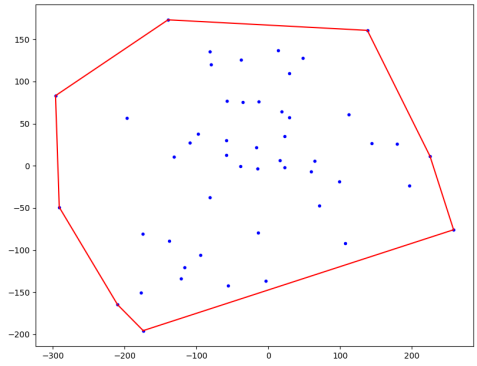
Problem 1

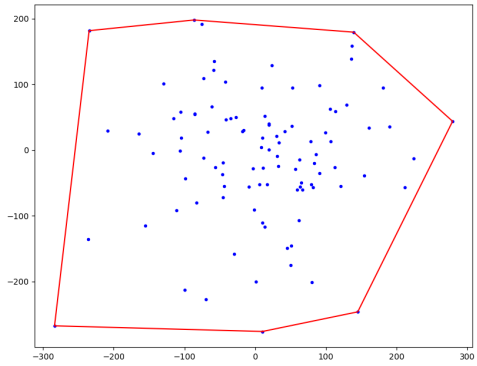
The solution for this problem is given in `q1.py`. The script generates random points from a random normal distribution and computes convex hull for the same. A few examples are given below:



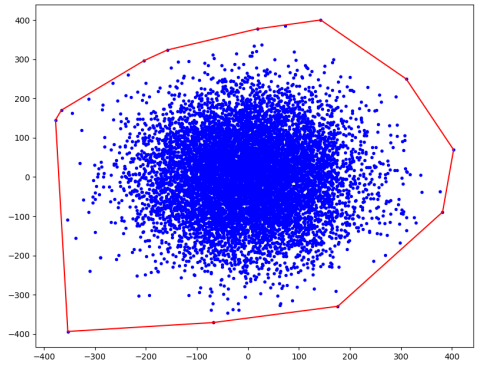
(a) 10 points



(b) 50 points



(c) 100 points



(d) 10000 points

Figure 1: Convex hull for different number or randomly generated points

Problem 2

The solution to this problem is given in `q2.py`. The script takes an input file given in `polygon.txt`. In the output images below, the dotted green lines represent the visibility graph Some examples of the output with the shortest path is given as below:

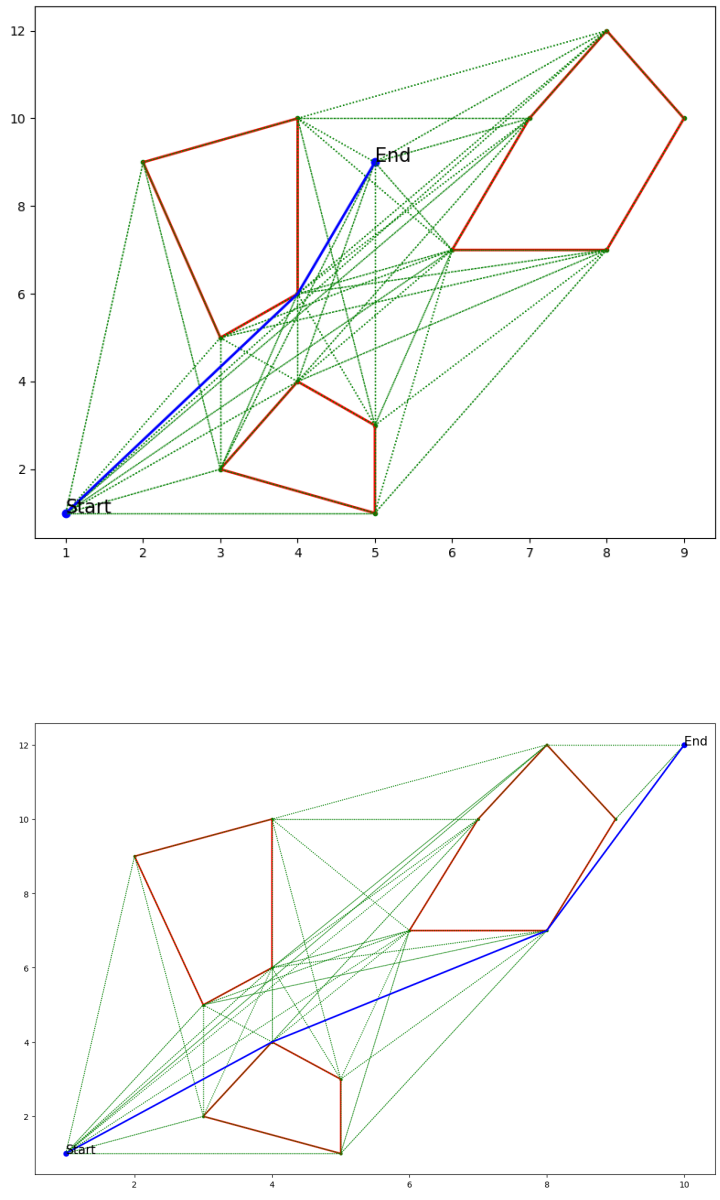


Figure 2: Shortest path of a point robot given different end points

Problem 3

The solution to this problem is given in the `q3.py`. The scripts takes an input file given as `robot1.txt` or `robot2.txt` or `robot3.txt`, which contains the configuration for the environment and the robot. The configuration file is to be provided to the program as a command line argument. Some examples of the output are as given below:

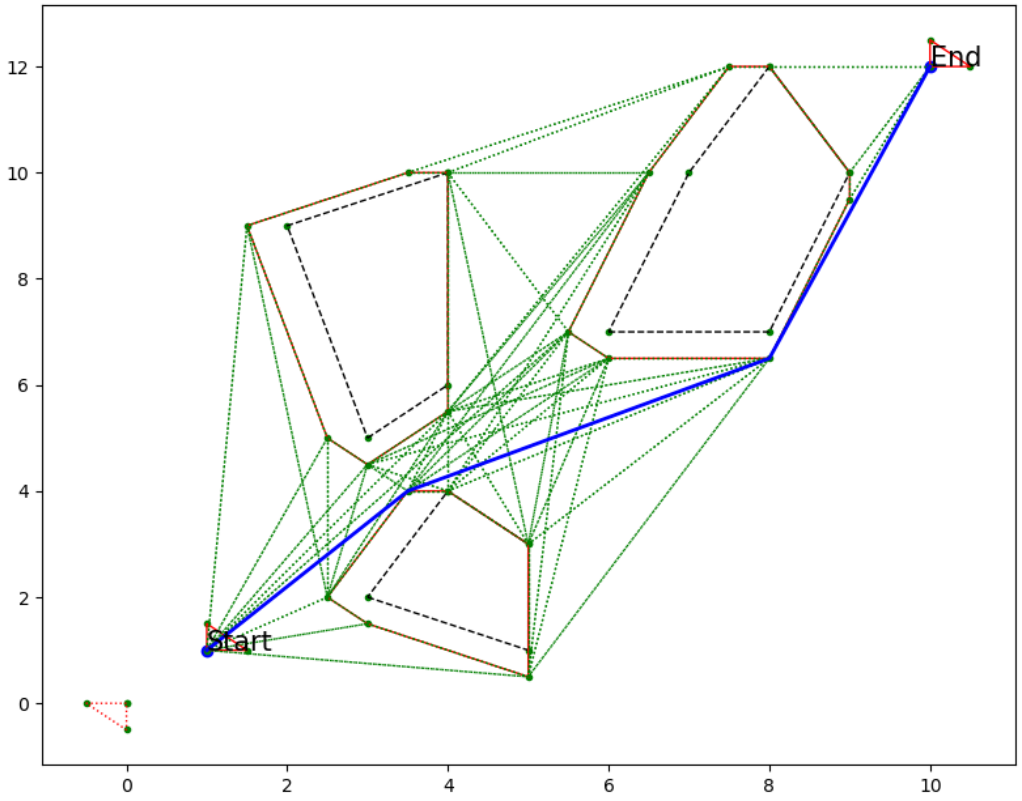


Figure 3: Shortest path between start and end point for a triangle shaped robot (`robot1.txt`)

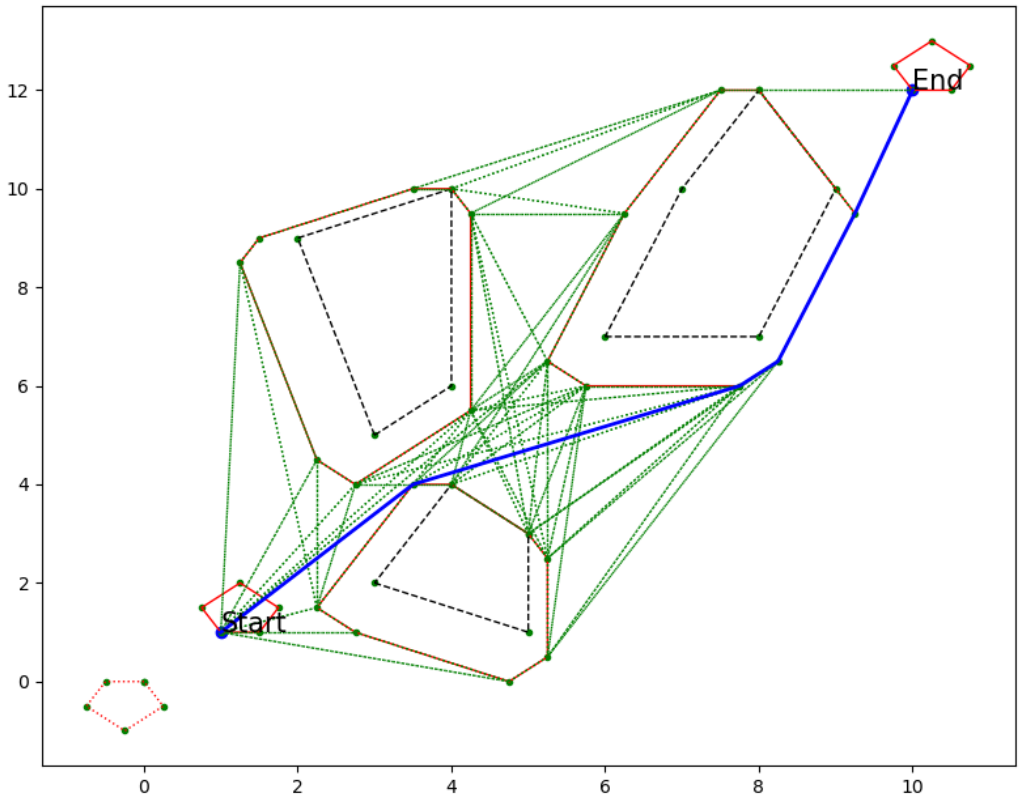


Figure 4: Shortest path between start and end point for a triangle shaped robot (`robot2.txt`)

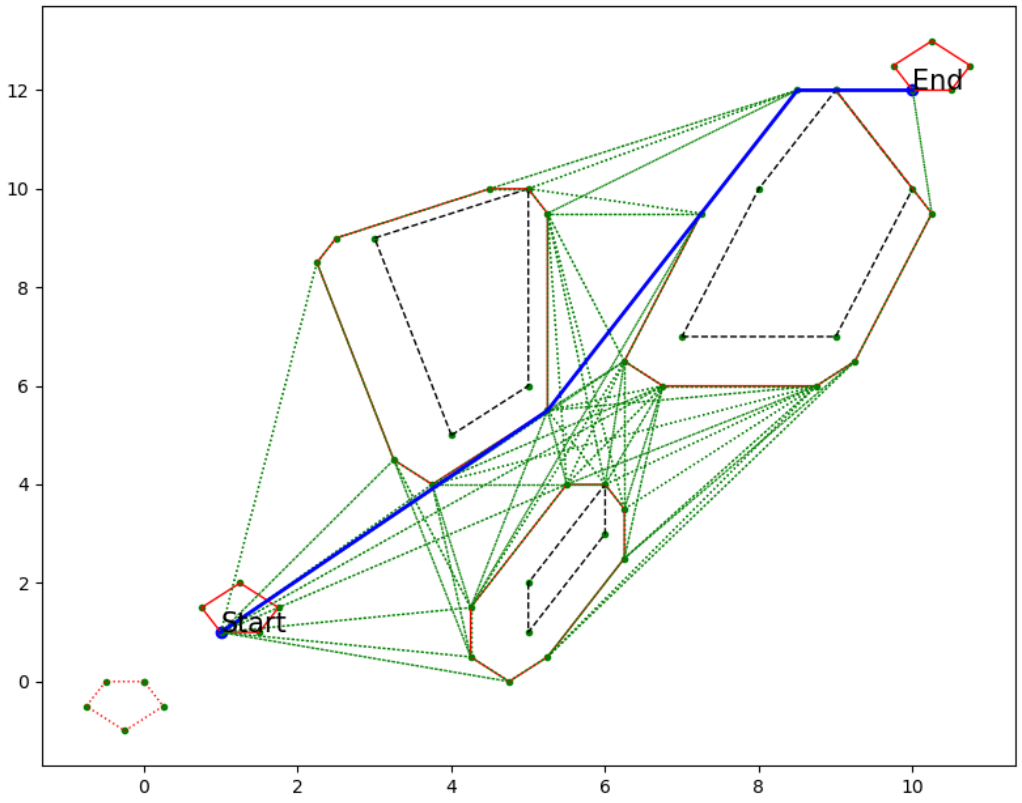


Figure 5: Shortest path between start and end point for a pentagon shaped robot (`robot3.txt`)