CIS 716 Homework 1

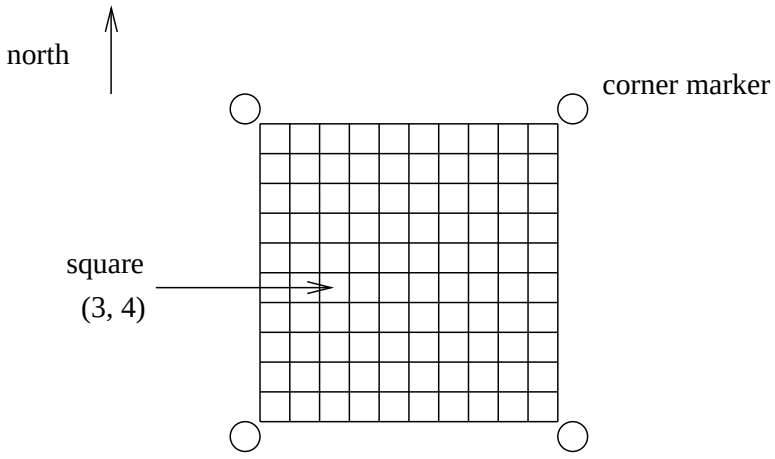
1. Design a controller for the robot in the first project using the subsumption architecture approach.

   You should (i) draw out a diagram showing the interaction between modules (where modules are things like "follow line", "backup when obstacle detected", "indicate green area found" and "stop at silver area".) and (ii) write out a description of this program in NQC that shows how the interaction between these modules will be handled.

   (50 points)

2. Consider a robot operating in the gridworld described below. The robot can move north, south, east and west one square at a time, and receives sensor data that gives the number of squares north/south and east/west to a corner marker.

   Describe how Monte-Carlo Localization can be used to localize the robot.



   Assume that if the robot tries to move in a direction, north say, it has a 70% chance of moving that way and a 10% chance of moving in every other direction.

   Further assume that if the robot gets a sensor reading saying it is (x, y) away from a marker, it has a 50% chance of being that distance away, and a 6.25% chance of being (x',y') away from the marker,

such that either $x' = x$ plus or minus 1 and $y' = y$ plus or minus 1. (50 points)