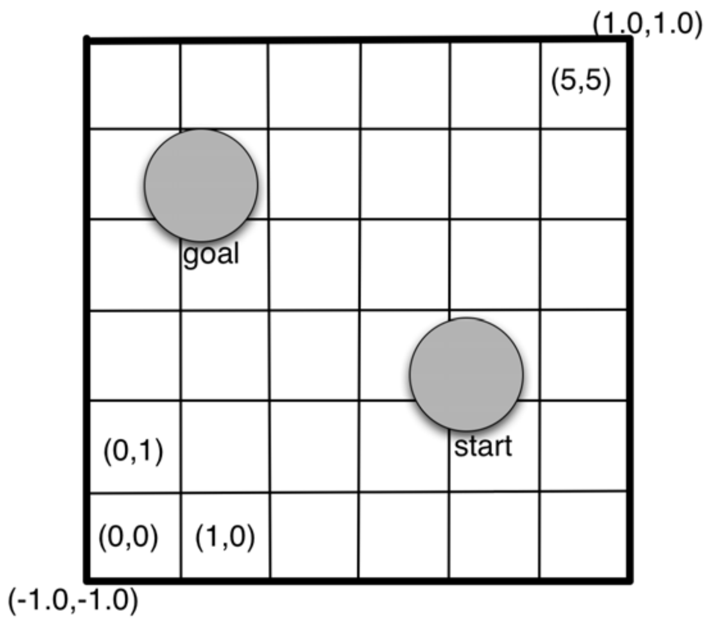
Problem Wk.14.1.1: Modeling the world

Please read the Software Lab 14 handout.

The maps below show a 6 x 6 grid world, with real *x* and *y* coordinates ranging from -1 to +1. That means that each *x,y* grid cell is roughly 1/3 of a meter on the side. For this problem, we will assume that the robot has a radius of 0.2 meters.

Note that in the grid, the `(0,0)` indices represent the lower left corner of the space.

1. Consider the situation below:



   What, roughly (within 0.1), is the starting pose of the robot?

   x = ______ meters, *y* = ______ meters,

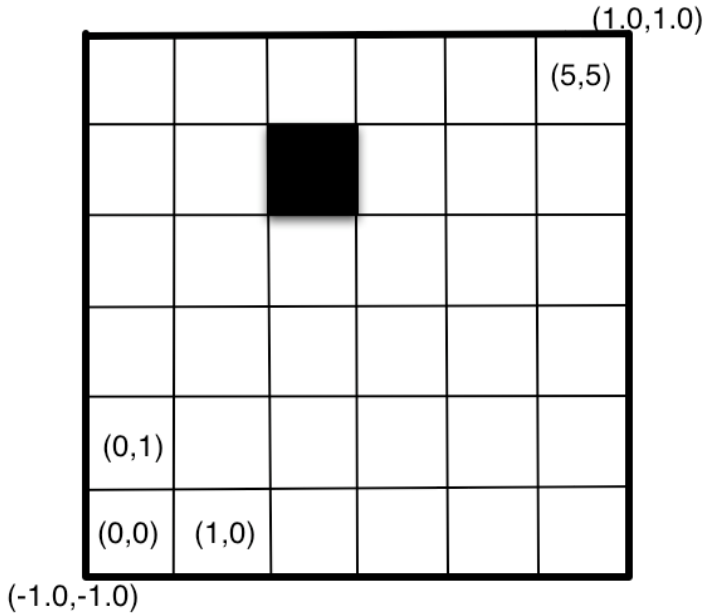
   What are the indices corresponding to this pose?

   `ix =` ______, `iy =` ______,

   What is the point at the center of the cell corresponding to these grid indices?

   x = ______ meters, *y* = ______ meters,

2. Consider the situation below (which includes an occupied grid cell):



Assume that there are walls around the whole space, so that any grid location where part of the robot would be off the grid would generate a collision.

What are all the `(ix, iy)` grid indices that would be safe (**NOT** cause a collision) (using a robot radius of 0.2 m). Recall that in general you don't know where the robot is within the cell, so you have to be conservative and assume it could be anywhere within the cell. The orientation of the robot does not affect whether it's in collision, since we are treating the robot as if it were circular.

Enter a list of tuples of `(ix, iy)` indices as you would in Python, e.g. `[(1,2), (3,4)]`: