Can Computers Think?
Week 5 Homework

Due Tuesday February 19

1. Reactive (stimulus-response) agents can be specified in terms of the sensory input they can receive, the actions they can carry out, and the agent function which maps sensory input to actions. In class you have seen an abstract specification and an implementation of a reactive agent that finds a wall and follows it. Now, assume that some cells of the agent's grid world contain cookies. If the agent happens to be in a cell with a cookie, it should eat the cookie before moving on. **Extend the formal specification** of the wall-following agent to incorporate this behavior. (Hint: You need to add an *eat* action, a sensor that lets the agent know if there is a cookie in the cell it is currently occupying, and a rule to the agent function that lets agent behave as required.)

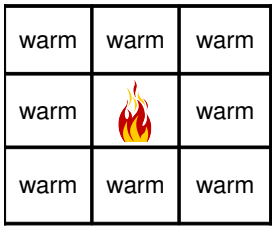
2. Now, **extend the implementation** of the wall-following agent accordingly. That is, add some cookies to the grid environment and change the agent function so that the agent behaves as described above when it comes across a cookie. (You can download the implementation of the wall following agent that we saw in class from the course website.)

3. Here is a specification of an agent that randomly moves around the grid environment:

actions:	move(x), where x is north, east, south, west
percepts:	none
agent function:	possible_moves = [north, east, south, west]
	randomly choose x from possible_moves
	move(x)

   You can download an implementation of this randomly-moving agent from the course website. This agent can bump into walls and obstacles because it doesn't have any sensors. In the implementation, the agent simply stays where it is if it tries to move to a cell that is blocked by a wall or an obstacle.

   Now, assume that there is a fire in some cells in the grid-world, which warm the surrounding cells (see figure). And assume that our agent likes it warm but not hot. So, if the agent comes by a fire (on its random walk through the grid-world), it will want to stay close to the fire but will want to avoid moving into the cell with the fire. **Extend both the**



formal specification and the implementation of the randomly-moving agent such that they model this warmth-loving behavior. To do so, you need to make sure that the agent can sense whether the cells surrounding the agent are cold, warm, or hot, and you need to change the agent function such that the agent never moves into hot cells, prefers warm cells to cold cells and chooses randomly if there are several different options.

CodeLab

This week's CodeLab exercises (week 5) are **due by Thursday February 14th**.

Reading

Zelle Chapters 2.6, 2.7 and 11.1, 11.2.

How to Think Like a (Python) Programmer Chapter 10. This book is available online. There is a link on the course web site – check the January 31 entry on the schedule.

Russell and Norvig (2003). Artificial Intelligence: a modern approach (2nd edition). Chapter 1: Intelligent Agents. Check Blackboard for an electronic copy.