Exercise Sheet 1

Exercise 1

Describe with few sentences what is the difference between:

- Performance Measure
- Utility Function

in the context of intelligent agents.

Exercise 2

Consider an "intelligent" agent which is a robot in an egg farm. The robot must look at boxes containing 12 eggs. Eggs come in three sizes (say, small, medium, and large). The task of the robot is to go through the eggs in a box one-by-one and discard all the eggs of a specific size (say, small).
You decide to program the robot preparing a table of all the actions for every possible percept sequence. How large would this table be?

Exercise 3

The previous "table" agent is clearly not practical. Which kind of agent would you devise for the previous task? Try to choose the simplest agent you can find and describe it with a pseudo-code.

Exercise 4

In many economic models, agents are characterized by an utility function agents try to maximize. This utility has somewhat to do with their "happiness" which we model as $u(C, L) = \log C + \gamma \log L$ where C is how much they consume (spend) and L is how much free time they have (leasure) [1]. These are competing goals the agent wants to maximize. Since they can spend only what they earn, $C = WH$ where W is the wage and H the hours worked. We assume that while not working, agents have fun, so $L = 1 - H$ (everithing is normalized to 1).

- Reduce the utility $u(C, L)$ to a function of the worked hours $u = u(H)$ (consider W as a fixed constant).
- Find how many hours H should be worked for maximizing u: this should be close to what an agent will be trying to achieve.

[1] The logarithm is a very simple way to quantify a stilized fact about economic agents. If you do not have money and receive some, your "happiness" changes a lot. If you have already a lot of money, an addition does not change your utility function much. This simple observation is modeled with a function which growth keeps slowing down, like the logarithm. In the literature, more complex functions are considered (like the Arrow-Pratt function, see lecture slides)