CPT_S 540 HW1

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1. a) Yes, in 2014 a robot called AGILUS played games against world top ping-pong player Boll.
   b) Yes, Google has developed self-driving car for a few years and the performance of Google car is persuasive.
   c) Yes, Google has developed self-driving car for a few years and the performance of Google car is persuasive.
   d) No, there is currently no such AI system that can identify foods in real market based on the week's need.
   e) Yes, a lot of companies (such as Amazon) have the elegant algorithm to analysis what people are likely to buy, so it is not hard to make an online shopping robot for human.
   g) Yes, there are several techniques to perform automated theorem proving such as First-order resolution, model elimination, DPLL, etc.
   h) Yes, there are many fiction generators online.
   k) No, currently the robot surgeon can only perform simple surgery such as stitching tissue.

2. a) Partially observable, the agent only can observe part of the world
   b) Single agent, only one agent solves the problem
   c) Deterministic, the agent makes next move based on its pervious moves
   d) Non-episodic, every new game has different world settings
   e) Static, the Wumpus world will not be changed while the agent is deliberating
   f) Discrete, the agent can reach countable state and takes countable moves to solve the game
   g) Known, the agent will always notice the effect of its current move

3. a) An rational agent in the Wumpus World means that it can gather information from current move and use pervious information to make the next move and do all the steps by itself.

b) Since there is only 1 squares out of 16 cannot be used, $choice_{gold}$ = 15, $choice_{monster}$ = 14 (14 squares left for placing 1 monster), $choice_{pit}$ =C_{13}^{3}= 286 (13 squares left for placing 3 pits). Finally, we multiply them together $choice_{total}$ = 15 * 14 * 286 = 60060

4.

Performance	Gain maximum profits
Environment	Real world stock market
Actuators	Buy and Sell stocks
Sensors	The price of stocks, and curve of prices change over time

The stock agent is:

a) Fully observable, every stock data is accessible to the agent
b) Single agent, only one agent participating in this environment
c) Deterministic, the state of environment completely determined by current state
d) Non-episodic, the stock market changes every day in different way
e) dynamic, the entire stock market will be changed while the agent is deliberating
f) Continuous, there is no specific state for stock market.
g) Unknown, the agent will not know the effects of their actions (buying or selling stock)

In my opinion, the stock agent should be designed as a utility-based agent, because the agent should perform actions based on the rule that gain maximum utility (gain maximum possible profit in stock market).

5. a) False, because a rational agent depends on if it can gather information. It doesn't require a rational agent in a fully observable environment, if the agent is adaptability and autonomy.
   d) Ture, because agent programs implement agent functions. The agent program gathers the information and pass the same information to the agent function.

e) False, suppose that an action requires to access all the information while the agent can only view part of them. In this scenario, the action function cannot be implemented directly.
f) False, perform action randomly is a violation of adaptability, therefore the agent cannot be rational.
i) False, a rational agent doesn't need to be performs action correctly every time. A perfect rational pucker agent could lose a few games if it could learn from the lost game.