4511W, Spring-2020
ASSIGNMENT 1 :
**Assigned: 01/27/20 Due: 02/03/20 at 11:55 PM** (submit via Canvas, you may take a picture of handwritten solutions, but you must put them in a pdf) Submit only pdf or txt files

## Written/drawn:

**Problem 1**. (20 points)
Read this article (a bit old):
http://spectrum.ieee.org/automaton/robotics/artificial-intelligence/how-google-self-driving-car-works

Based off the article, describe the sensors of google's self driving car. Classify the environment/actions for this problem based on the first 6 categorizations we went over in class (and are in the book) (you may skip known vs. unknown).

**Problem 2**. (20 points)
Specify whether the following program is simple-reflex, model-based reflex, goal or utility based. Justify what about the program makes it fit into your chosen category.

(1) Google maps finding you the shortest route between two places.

(2) You are planning a trip to Guatemala and are planning to fly. You made a program that checks the ticket prices in the last week to estimate whether on average the price is going down or up (line of best fit). You use this to determine whether you should buy the ticket now or wait for the price to drop more.

(3) You are playing the Wiki-game/Wikipedia race:
https://en.wikipedia.org/wiki/Wikipedia:Wiki_Game
... or play it:
https://www.thewikigame.com/

You attempt to solve this by quickly scanning the linked words and guessing which will lead you closer to the desired entry. What best describes the process you are doing?

(4) You want to get a good grade on some homework (hopefully this one!) and you've been working on it for a while. At this point you can: just turn it in, study the materials more, or review your current answers for mistakes.

**Problem 3**. (20 points)
(1) For each of the 7 categorizations, indicate which type is the harder classification to solve (i.e. is "fully observable" harder or easier than "partially observable"?)

(2) Which of the 7 choices you made in part (1) would be the single hardest part to solve for? Justify your reason.

(3) When choosing whether to write a simple-reflex or a model-based reflex program, which of the 7 categorizations has the largest impact?

**Problem 4**. (25 points)
For each of the follow answer whether or not the described process is rational for solving the problem at hand. As always, justify your answer. Note: this is the **strict definition** used in the class, not just any

English definition of the word.

(1) You make a Tic-Tac-Toe algorithm as follows. First, you check and see if the opponent has 2 in-a-row... if so you block them from getting 3 in-a-row. Otherwise, you play randomly.

(2) You make a simple AI for the game snake ( https://www.google.com/search?q=play+snake ... click top interactable "play" button). The AI works as follows (loose pseudo-code):
1. Go right until you are 1 square away from a wall or your own tail, then go down one square.
2. Go left until you are 1 square away from a wall or your own tail, then go down one square.
3. Repeat this going back and forth until you are on the bottom (or top) row and then change "go down one square" to "go up one square", thus going left and right upwards rather than downwards (or once you reach the top row, start going back downwards).

(3) Suppose you are working in the kitchen at a restaurant and part of your job is putting dishes into the dishwasher. To be the most efficient you want to put as many dishes in per-cycle as you can. Your restaurant has three different dishwashers that only differ on the size/volume of them (i.e. no restrictions on where you can put dishes). Your "algorithm" is to sort the dishes/pots/pans by size, then starting with the largest item, put it into the largest dishwasher that still has space for the item.

For example, if I were to give capacities of the dishwashers as: [10, 7, 5]
... and the dishes/items as: 8, 4, 3, 2, 1

Then the "algorithm" would put (1) dish_8 into washer_10, (2) dish_4 into washer_7, (3) dish_3 into washer_7, (4) dish_2 into washer_10 and (5) dish_1 into washer_5.

## Programming (python/lisp):

The book provides code for the algorithms presented. For this class, we will use the python version of the code. Download the python code here:
https://github.com/aimacode/aima-python

I'd recommend **NOT** doing their install feature. You can simply download the code and start running it in python3 without doing anything else.

**Problem 5**. (15 points)
Write a single sentence describing what "hw1.py" (link below) is doing and copy-paste the output after the program has finished. To run this file, simply put it in the base directory (with things like "README.mb"). Then navigate to that folder and type: python3 hw1.py

http://www-users.cselabs.umn.edu/classes/Spring-2020/csci4511/assignments/hw1.py