Question 1

For the below local search questions, assume a problem where the goal is to maximize an objective function, and every state in the state space has a different cost.

a) If you re-run steepest-ascent hill-climbing multiple times, each time starting from a different starting state, will you always ultimately find the same solution? Why or why not?
b) If you re-run steepest-ascent hill-climbing multiple times, each time starting from the same starting state, will you always ultimately find the same solution? Why or why not?
c) If you re-run stochastic hill-climbing multiple times, each time starting from the same starting state, will you always ultimately find the same solution? Why or why not?

Answers

a) TODO
b) TODO
c) TODO

Question 2

Recall that in lecture, we gave the following pseudocode for a HILL-CLIMB algorithm, where the goal is to maximize an objective function.

```
1. function Hill-Climb(problem):
2.     current = initial state of problem
3.     repeat:
4.         neighbor = highest valued neighbor of current
5.         if neighbor not better than current:
6.             return current
7.         current = neighbor
```

Consider what would happen if we replaced line 5 with the line:

```
5.         if neighbor worse than current:
```

What major problem might arise if we were to now run this updated HILL-CLIMB algorithm?

Answer

TODO

Question 3

A farmer is trying to plant two crops, Crop 1 and Crop 2, and wants to maximize his profits. The farmer will make $400 in profit from each acre of Crop 1 planted, and will make $500 in profit from each acre of Crop 2 planted.

However, the farmer needs to do all of his planting today, during the 12 hours between 7am and 7pm. Planting an acre of Crop 1 takes 2 hours, and planting an acre of Crop 2 takes 3 hours.

The farmer is also limited in terms of supplies: he has enough supplies to plant 4 acres of Crop 1 and enough supplies to plant 10 acres of Crop 2.

Translate this problem into a linear programming problem, where the variable C1 represents the number of acres of Crop 1 to plant, and the variable C2 represents the number of acres of Crop 2 to plant.

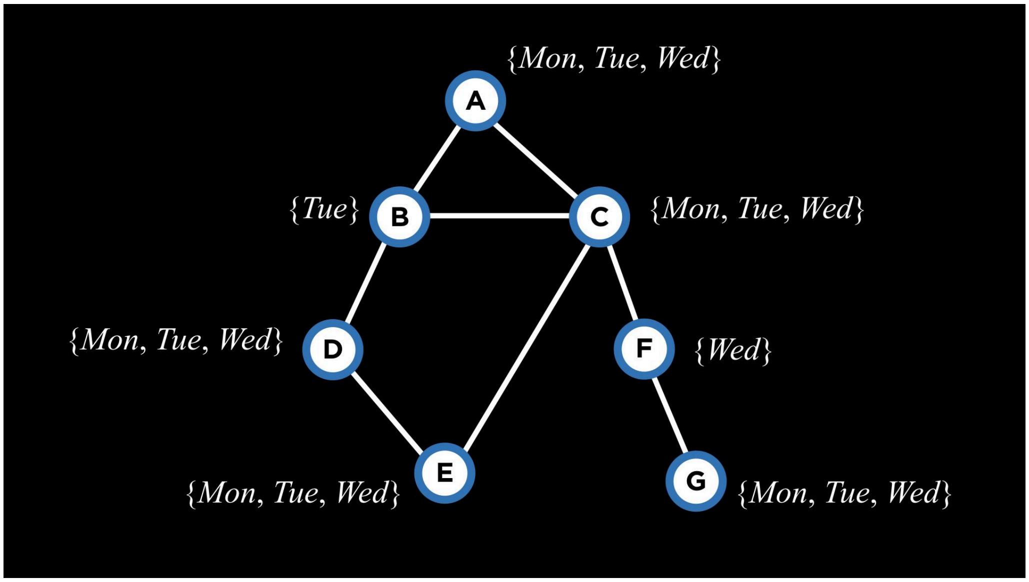
a) What is your cost function? (This should be the function whose value you are trying to minimize.)
b) What are your constraints?

Answers

a) TODO
b) TODO

Question 4

Consider the following exam scheduling constraint satisfaction graph, where each node represents a course. Each course is associated with an initial domain of possible exam days (most courses could be on Monday, Tuesday, or Wednesday; a few are already restricted to just a single day). An edge between two nodes means that those two classes must have exams on different days.



After enforcing arc consistency on this entire problem, what are the resulting domains for each of the variables? Give one domain for each variable A, B, C, D, E, F and G.

Answers

a) TODO
b) TODO
c) TODO
d) TODO
e) TODO
f) TODO
g) TODO