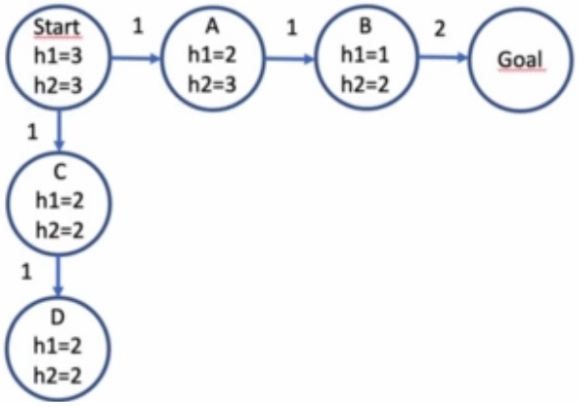
1. (a) Is A* complete? Provide a conclusive argument supporting your answer.

(b) Does A* compute optimal solutions? For tree search, for graph search? Provide conclusive arguments supporting your answers.

2. In the state space depicted below, indicate the order of generation and the order of expansion of nodes by the A* algorithm, using the heuristic h1 and h2 (you have to provide two traces). Ties are broken with largest g. Which is the heuristic that expand more nodes? Is it the most informed one?



3. You have to organize a dinner at home, with two courses, starter and main plate, and wine. You have the following options:
Starter: smoked salmon salad (SSS) or iberic ham (IH)
Main plate: hake (H, merluza) or steak tartar (ST)
Wine: young red (R), young white (W)
You have to select one option of each (the whole dinner is the same for everyone).
Not all combinations have the same preference. There are three cost funcions:

Starter/wine	R	W
SSS	2	1
IH	1	6

Main plate/wine	R	W
ST	1	8
H	4	1

Main plate/Starter	SSS	IH
ST	2	1
H	1	5

(a) Solve this problem by UCS. How many nodes do you expand?
(b) Looking for a more efficient algorithm, you decide to use heuristic search. Which algorithm would you choose? Why? As heuristic, you may take the mínimum of the cost functions involving some course still undecided [for instance, if you are considering wine=R, you know that this option will cost you at least 1 (starter) + 1 (main plate) + 1 (starter-main plate)].
(c) Solve this problem with that algorithm. How many nodes do you expand? Is it more efficient than UCS?

4. How do you compute a pattern database? Show it computing the entry for the database of single tile 1, for the following pattern:

* * *
* * *
1 * *

The goal is with the empty space in the lower right corner.