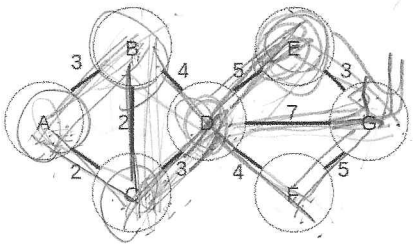
2. (50 points) Search



Node	h_1	h_2
A	12.5	11
B	12	10.5
C	11	9
D	6	6.75
E	1	2
F	4.5	4.5
G	0	0

Consider the state space graph shown above. A is the start state and G is the goal state. The costs for each edge are shown on the graph. Each edge can be traversed in both directions.

(a) [4 pts] **Admissibility and consistency part I**

(i) [2 pts] For heuristics h_1 and h_2, determine whether each is admissible.

h_1 is not admissible, h_2 is admissible

(ii) [2 pts] For heuristics h_1 and h_2, determine whether each is consistent.

h_1 is not consistent, h_2 is consistent

(b) [10 pts] **Order of expansion**
List out the order of node expansion for each of the graph search strategies.

(i) [2 pts] Depth First Search

ABCDEG

(ii) [2 pts] Breadth First Search

ABCDEFG

(iii) [2 pts] Uniform Cost Search

ACBDFEG

(iv) [2 pts] A* Search with heuristic h_1

ACDEG

(v) [2 pts] A* Search with heuristic h_2

ACDG

(c) [12 pts] **Possible paths returned** For each of the following **graph search strategies** (*do not answer for tree search*), mark which, if any, of the listed paths it could return. Note that for some search strategies the specific path returned might depend on tie-breaking behavior. In any such cases, make sure to mark *all* paths that could be returned under some tie-breaking scheme.

Search Algorithm	**A-B-D-G**	**A-C-D-G**	**A-B-C-D-F-G**
Depth first search	(i) ✓	(ii) ✓	(iii) ✓
Breadth first search	(iv)	(v)	(vi) ✓
Uniform cost search	(vii)	(viii)	(ix)
A* search with heuristic h_1	(x)	(xi)	(xii)
A* search with heuristic h_2	(xiii)	(xiv) ✓	(xv)