

IN-CLASS EXERCISE (I2)

Student ID:

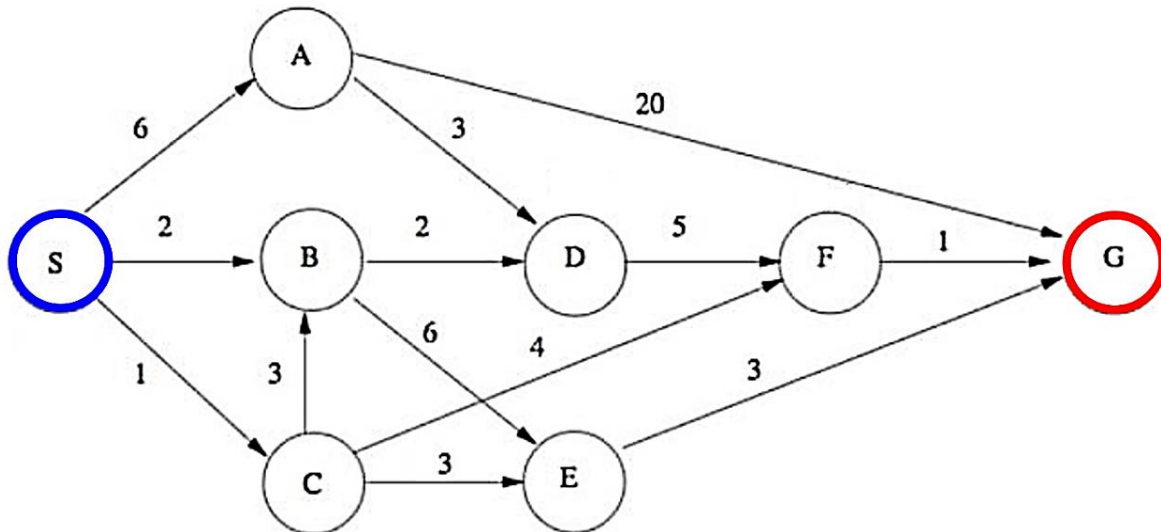
Duration: 20 mins

Date: 26/02/2024

Student name:

Score:/3

Q1 (2.5pts) Consider the following graph. The initial state is **vertex S**, and the goal state is **vertex G**. The heuristic table is shown aside the graph. **Ties are broken in alphabetical order.**



Vertex	S	A	B	C	D	E	F	G
Heuristic	6	8	4	5	2	2	1	0

For each of the following search strategies, state the order in which states are expanded and the path returned. Vertices should be presented in their exact order. *Note that:*

- The path returned will not be accepted if the list of expanded states is wrong.
- We apply early stopping for BFS, DFS, and GBFS.

Algorithm	List of expanded states in exact order	Path returned
Uniform cost search (0.5pt)	S C B D E F A G	S C F G
Breadth-first search (0.5pt)	S A	S A G
Depth-first search (0.5pt) avoid repeating any state on the current path	S A	S A G
GBFS (0.5pt)	S B D F	S B D F G
A* (0.5pt)	S B C D E F G	S C F G

Q2 (0.5pt) Is the heuristic given in Q1 consistent? If not, point out any pair of vertices that violate the condition of consistency and explain why.

No. The two vertices, A and D, give $h(A) = 8 > h(D) + \text{cost}(A, D) = 5$, which violates the condition of consistency.

IN-CLASS EXERCISE (I2)

Student ID:

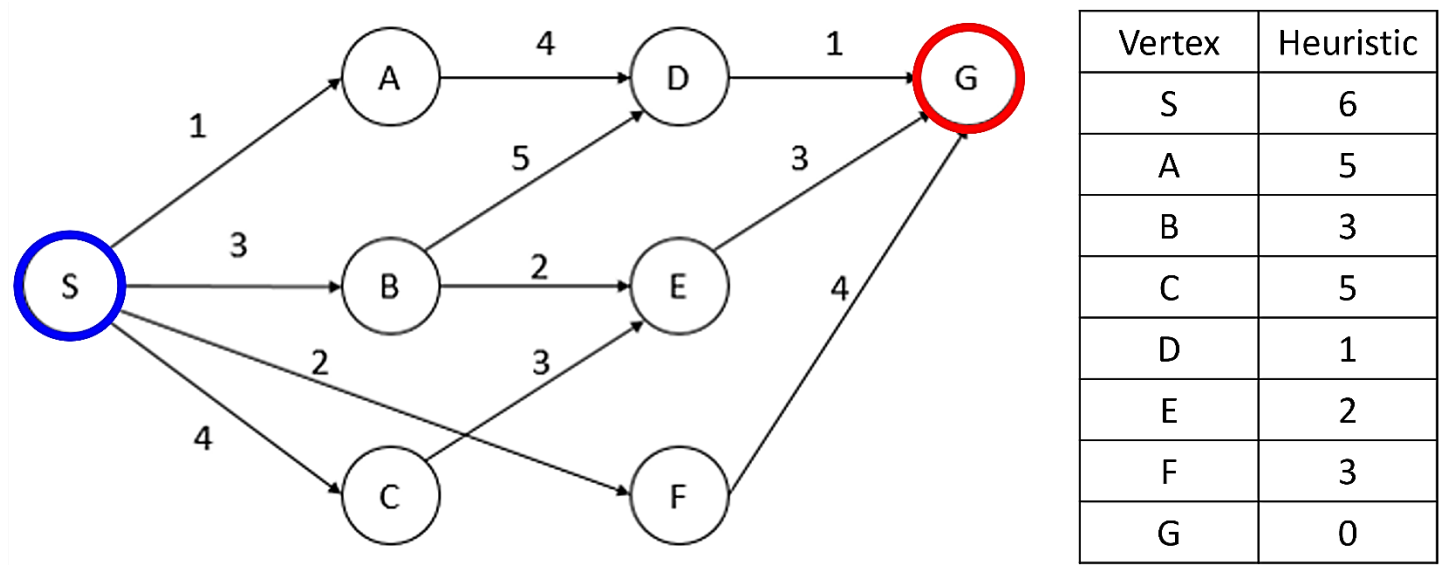
Duration: 20 mins

Date: 26/02/2024

Student name:

Score:/3.

Q1 (2.5pts) Consider the following graph. The initial state is **vertex S**, and the goal state is **vertex G**. The heuristic table is shown aside the graph. **Ties are broken in alphabetical order.**



For each of the following search strategies, state the order in which states are expanded and the path returned. Vertices should be presented in their exact order. *Note that:*

- The path returned will not be accepted if the list of expanded states is wrong.
- We apply early stopping for BFS, DFS, and GBFS.

Algorithm	List of expanded states in exact order	Path returned
Uniform cost search (0.5pt)	S A F B C D E G	S F G (S A D G acceptable)
Breadth-first search (0.5pt)	S A B C F	S F G
Depth-first search (0.5pt) avoid repeating any state on the current path	S A D	S A D G
GBFS (0.5pt)	S B D	S B D G
A* (0.5pt)	S F A B D G	S F G (S A D G acceptable)

Q2 (0.5pt) Is the heuristic given in Q1 consistent? If not, point out any pair of vertices that violate the condition of consistency and explain why.

No. The two vertices, S and F, give $h(S) = 6 > h(F) + \text{cost}(S, F) = 5$, which violates the condition of consistency.

IN-CLASS EXERCISE (I2)

Student ID:

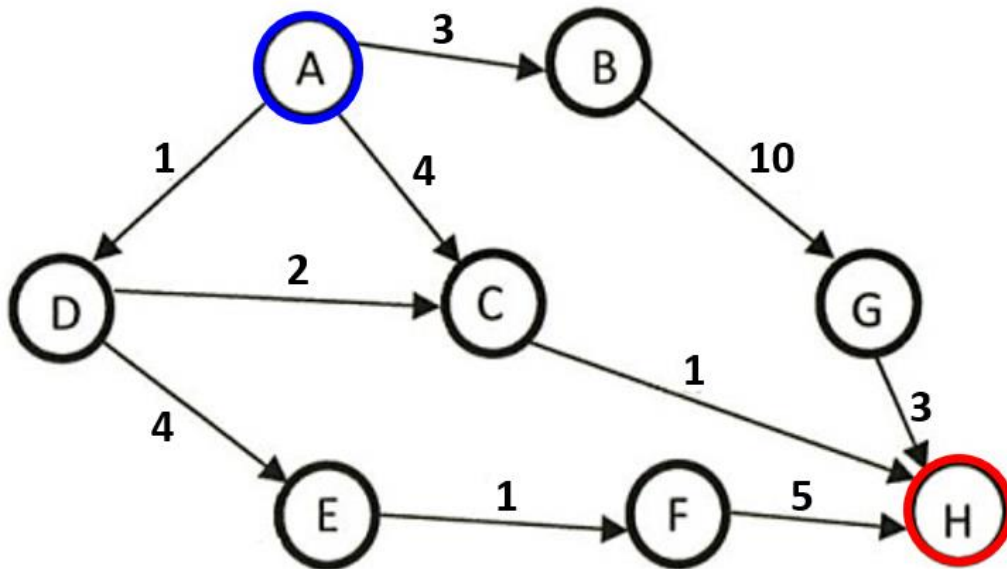
Duration: 20 mins

Date: 26/02/2024

Student name:

Score:/3.

Q1 (2.5pts) Consider the following graph. The initial state is **vertex A**, and the goal state is **vertex H**. The heuristic table is shown aside the graph. **Ties are broken in alphabetical order.**



Vertex	Heuristic
A	3
B	5
C	1
D	3
E	2
F	4
G	7
H	0

For each of the following search strategies, state the order in which states are expanded and the path returned. Vertices should be presented in their exact order. *Note that:*

- The path returned will not be accepted if the list of expanded states is wrong.
- We apply early stopping for BFS, DFS, and GBFS.

Algorithm	List of expanded states in exact order	Path returned
Uniform cost search (0.5pt)	A D B C H	A D C H
Breadth-first search (0.5pt)	A B C	A C H
Depth-first search (0.5pt) avoid repeating any state on the current path	A B G	A B G H
GBFS (0.5pt)	A C	A C H
A* (0.5pt)	A D C H	A D C H

Q2 (0.5pt) Is the heuristic given in Q1 consistent? If not, point out the pair of vertices that violate the condition of consistency.

No. The two vertices, G and H, give $h(G) = 7 > h(H) + \text{cost}(G, H) = 3$, which violates the condition of consistency.

IN-CLASS EXERCISE (I2)

Student ID:

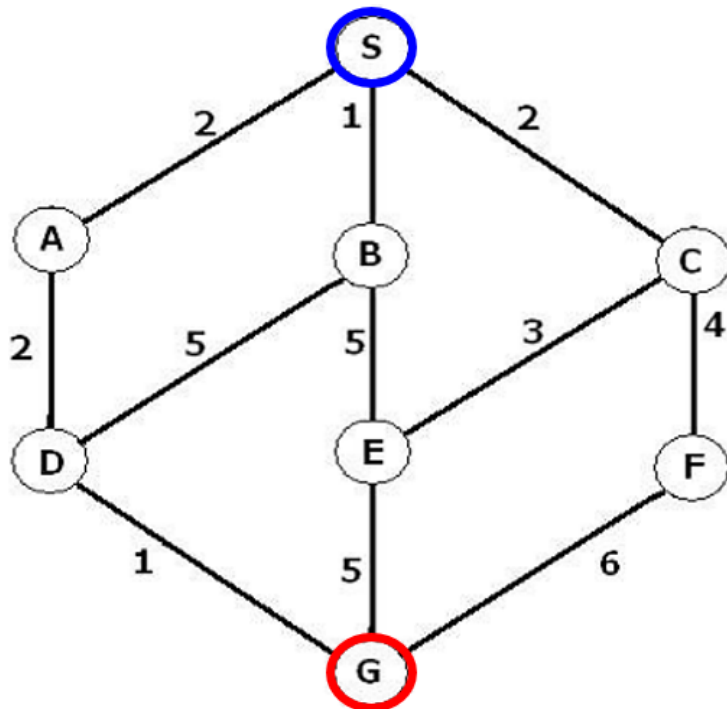
Duration: 20 mins

Date: 26/02/2024

Student name:

Score:/3

Q1 (2.5pts) Consider the following graph. The initial state is **vertex S**, and the goal state is **vertex G**. The heuristic table is shown aside the graph. **Ties are broken in alphabetical order.**



Vertex	Heuristic
S	4
A	6
B	3
C	3
D	2
E	5
F	5
G	0

For each of the following search strategies, state the order in which states are expanded and the path returned. Vertices should be presented in their exact order. *Note that:*

- The path returned will not be accepted if the list of expanded states is wrong.
- We apply early stopping for BFS, DFS, and GBFS.

Algorithm	List of expanded states in exact order	Path returned
Uniform cost search (0.5pt)	S B A C D E G	S A D G
Breadth-first search (0.5pt)	S A B C D	S A D G
Depth-first search (0.5pt) avoid repeating any state on the current path	S A D	S A D G
GBFS (0.5pt)	S B D	S B D G
A* (0.5pt)	S B C A D G	S A D G

Q2 (0.5pt) Is the heuristic given in Q1 consistent? If not, point out the pair of vertices that violate the condition of consistency.

No. The two vertices, A and D, give $h(A) = 6 > h(D) + \text{cost}(A, D) = 4$, which violates the condition of consistency.