

## CA2: AI Informed Searching

This assignment is worth **40%** of the total marks that are available for this module.

**This is an individual assignment.** (estimated workload (outside class time): 10 hours.)

### Requirements

You are required to answer question 1 and 2 provided.

**ALL answers must be provided in a Jupyter notebook ONLY. No Other format will be accepted.**

**Written answers and diagrams MUST be provided in Mark-up and programmatic answers in runnable code.**

**Any References Must be in HARVARD Style.**

**NOTE All written answers must be in your own words and not simply copied and pasted.**

### Marking Scheme (Sliding Scale)

Q1	(a i) Concise and Full Answer (Min 50 words)	5
	(a ii) Concise and Full Answer (Min 50 words)	5
	(a iii) Concise and Full Answer (Min 150 words)	15
	(b) Concise and Full Answer (Min 400 words)	25
Q2	Both Algorithms working	20
	Clear and Concise Comparison of Algorithms in Mark-up (min 500 words)	20
	Use of Timing statistics in code and Comparison	10
TOTAL MARKS:		100

**Please note: No other output will be graded**

### Deadline

This assignment is due at 23:55 on ~~Sunday 6<sup>th</sup> Dec 2020~~. **Late submission will be marked in line with CCT policy. Moved To Sunday 13<sup>th</sup> Dec 2020**

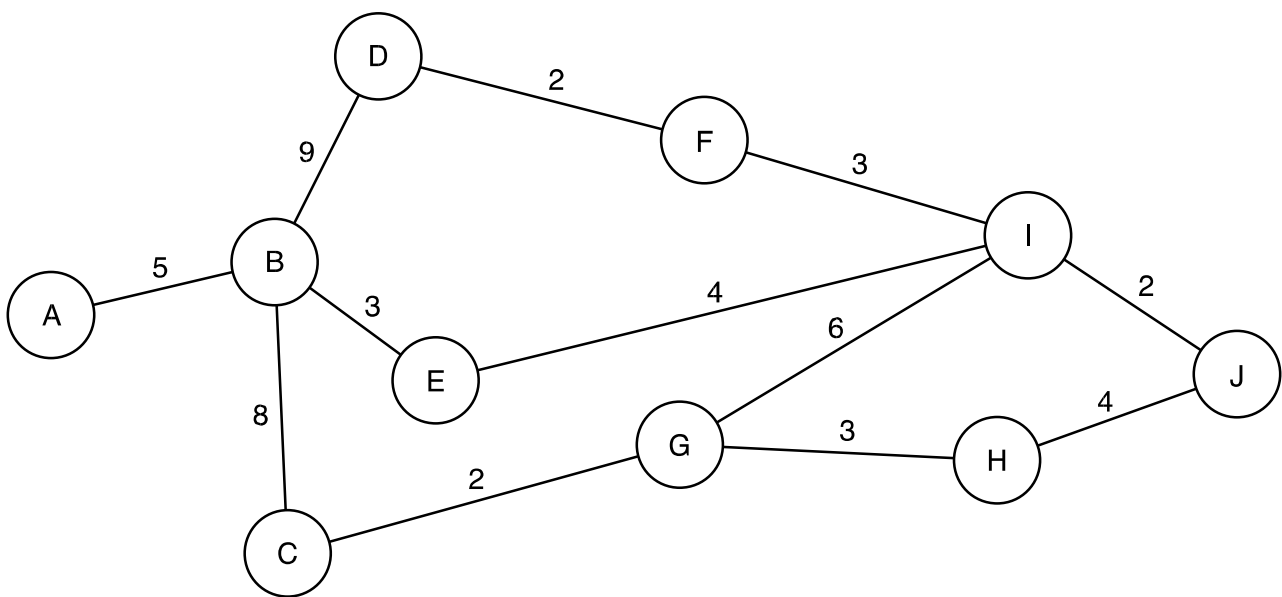
**Failure to upload your assignment will result in a 0% grade for this assessment.**

## Required Files

You are required to upload an Jupyter Notebook file onto Moodle, name it as yourName\_Class\_CA2.ipynb.

## Questions

- 1 A puzzle has multiple ways of reaching the end solution. Fig. 1 shows a graph that represents all possible routes to the solution. The starting point of the game is represented by A, the solution is represented by J. The other points in the graph are possible intermediary stages.



**Fig. 1**

- (a) The graph in Fig. 1 is a visualisation of the problem.
- (i) Identify **one** difference between a graph and a tree.
  - (ii) Explain how the graph is an abstraction of the problem.
  - (iii) Identify **two** advantages of using a visualisation such as the one shown in Fig. 1.
- (b) Demonstrate how Dijkstra's algorithm would find the shortest path to the solution in Fig.1 through diagrams and written explanation.
- 2 The creator of the puzzle has been told that the A\* algorithm is more efficient at finding the shortest path because it uses heuristics.

Compare the performance of Dijkstra's algorithm and the A\* search algorithm, making reference to heuristics, to find the shortest path to the problem by implementing both algorithms programmatically and comparing the solutions generated in Mark-up (**Note additional marks for including time statistics**)