Tutorial 4
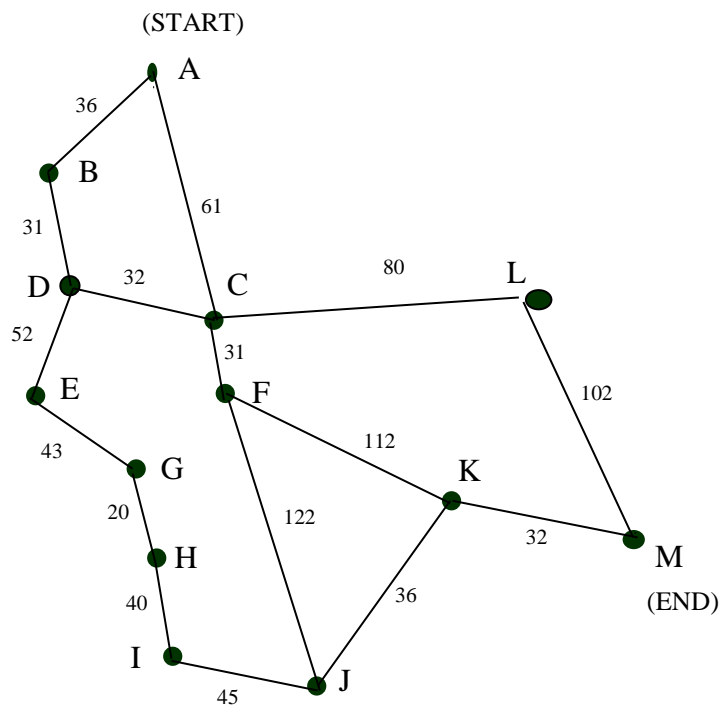# Informed Search Strategy

Question 1

a) Using an example (*any example other than example provided in the notes*), show and explain how Uniform Cost Search operates?

(8 marks)

b) Consider the following map.

Using the A* algorithm work out a route from town A to town M. Use the following cost functions.
➢ G(n) = The cost of each move as the distance between each town (shown on map).
➢ H(n) = The Straight Line Distance between any town and town M. These distances are given in the table below.

Provide the search tree for your solution and indicate the order in which you expanded the nodes. Finally, state the route you would take and the cost of that route.

Straight Line Distance to M

| A	223		E	165		I	100		M	0
B	222		F	136		J	60			
C	166		G	122		K	32			
D	192		H	111		L	102			

In your answer provide the following
  i)   The search tree that is produced, showing the cost function at each node

(10 marks)

  ii)   State the order in which the nodes were expanded

(2 marks)

  iii) State the route that is taken, and give the total cost

(1 mark)

c)   Explain the relationship between the A* algorithm and the Uniform Cost Search algorithm?

(4 marks)

Question 2

a)   Consider the following map.
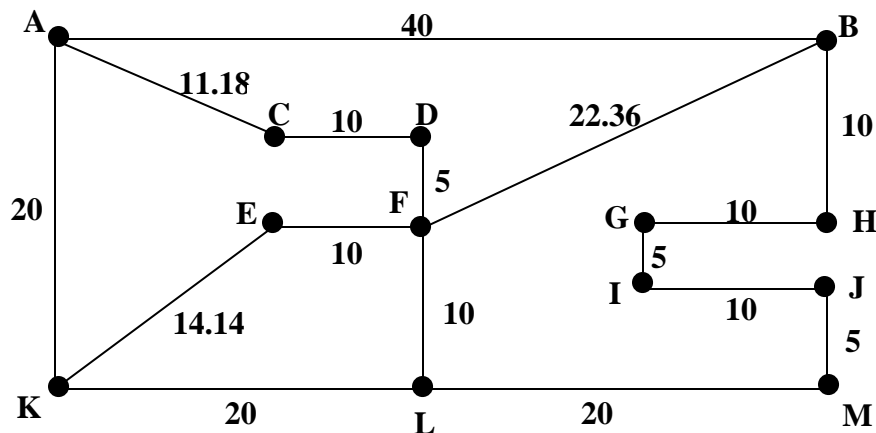
Using the A* algorithm work out a route from town A to town M. Use the following cost functions.
  ➢ G(n) = The cost of each move as the distance between each town (shown on map).
  ➢ H(n) = The Straight Line Distance between any town and town M. These distances are given in the table below.

Straight Line Distance to M

A	44.72	E	31.62	I	11.18	M	0.00
B	20.00	F	22.36	J	5.00		
C	33.54	G	14.14	K	40.00		
D	25.00	H	10.00	L	20.00		

i) Provide the search tree for your solution, showing the order in which the nodes were expanded and the cost at each node. You should not re-visit a town that you have just come from.

(14 marks)

ii) State the route you would take and the cost of that route.

(2 marks)

b) Assume the Straight Line Distance Table was replaced by the following table

Straight Line Distance to M

A	90.00		E	6.00		I	23.00		M	0.00
B	10.00		F	54.00		J	34.00			
C	40.00		G	19.00		K	27.00			
D	18.00		H	16.00		L	108.00			

i) What route would now be returned by the A* algorithm and what would the cost of that route be?

(6 marks)

ii) How do you account for the different routes returned by the two A* algorithms?

(3 marks)