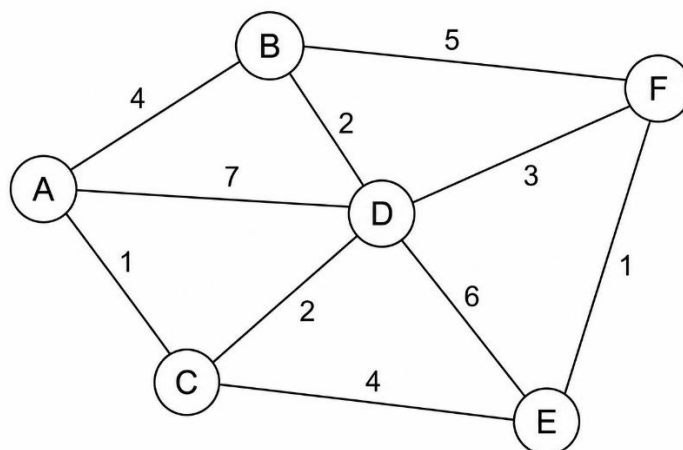




4.2.4 Graphs & Trees

- 1) **Figure 1** is a graph that shows the time it takes to travel between six locations in a warehouse. The six locations have been labelled with the letters A - F. When there is no edge between two nodes in the graph this means that it is not possible to travel directly between those two locations. When there is an edge between two nodes in the graph the edge is labelled with the time (in minutes) it takes to travel between the two locations represented by the nodes.

Figure 1



- a) The graph is represented using an adjacency matrix, with the value 0 being used to indicate that there is no edge between two nodes in the graph. A value should be written in every cell.

Complete the unshaded cells in **Table 1** so that it shows the adjacency matrix for **Figure 1**.

Table 1

	A	B	C	D	E	F
A						
B						
C						
D						
E						
F						

[2 marks]





- b) Instead of using an adjacency matrix, an adjacency list could be used to represent the graph. Explain the circumstances in which it would be more appropriate to use an adjacency list instead of an adjacency matrix.

[2 marks]

- c) State one reason why the graph shown in **Figure 1** is not a tree.

[1 mark]

- d) The graph in **Figure 1** is a weighted graph. Explain what is meant by a weighted graph.

[1 mark]

- e) Only the top half of the matrix in **Figure 1** was needed to represent this graph. For which type of graph would the bottom half also be needed?

[1 mark]

- f) Represent the graph shown in **Figure 1** as an adjacency list by completing **Table 2**.

Show the vertices and weight in this format: (vertex, weight)

Table 2

Vertex	Adjacent vertices
A	
B	
C	
D	
E	
F	

[3 marks]





2) Give **two** similarities and **two** differences between a tree and a graph data structure.

[4 marks]

