

Question 5

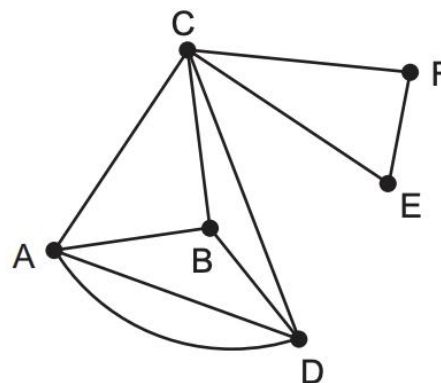
(9 marks)

Consider two country towns in which roads connect the local attractions. The adjacency matrix (Town 1) and graph (Town 2), shown below, represent the road connections between attractions (vertices) within each town.

Town 1

	A	B	C	D
A	0	1	2	0
B	1	0	2	0
C	2	1	1	1
D	0	0	2	0

Town 2



(a) Consider the adjacency matrix for Town 1.

(i) Explain why the network represented by this matrix is a directed graph. (1 mark)

(ii) Give **two** reasons why the network represented by this matrix is not a simple graph. (2 marks)

(b) Consider the graph shown for Town 2. The adjacency matrix for Town 2 has been squared, and is shown below.

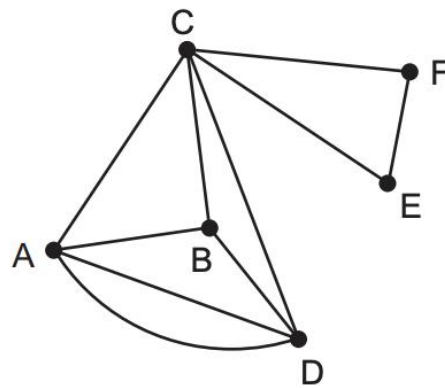
	A	B	C	D	E	F
A	6	3	3	2	1	1
B	3	3	2	3	1	1
C	3	2	5	3	1	1
D	2	3	3	6	1	1
E	1	1	1	1	2	1
F	1	1	1	1	1	2

(i) Explain the significance of the element in Row 3, Column 4. (2 marks)

(ii) Draw a connected subgraph containing only vertices A, C and D. (2 marks)

(c) The local council of Town 2 wants to add one extra road so that an Eulerian trail is possible.

(i) Draw an edge on the graph below that allows this to occur. (1 mark)



(ii) Explain why an Eulerian trail is now possible. (1 mark)