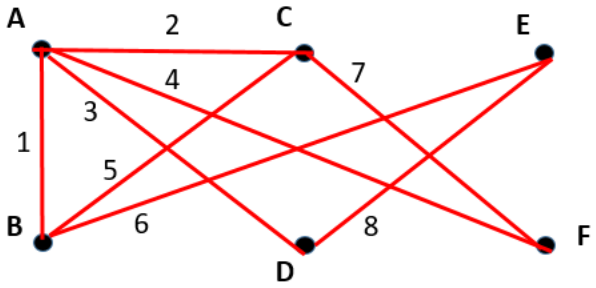
BM20A8800 Discrete Models and Methods 3op

Exercise 6 / Week 8



1. Let's examine the graph on the right. (Note: numbers are edge numbers, not weights.)

a) Define the adjacency, incidence and degree matrices.

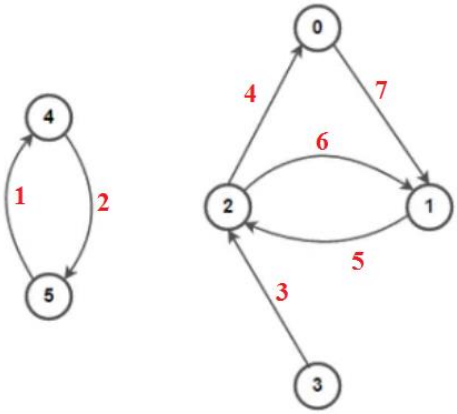
b) Define the Laplace matrix for the graph.

2. Continue working on the graph in problem 1:

a) In how many ways can we travel from node A to node B using exactly three steps?

b) In how many ways can we travel from node A to node B using not more than three steps?

c) If we start from node C, how many exactly 3-step long path options do we have?



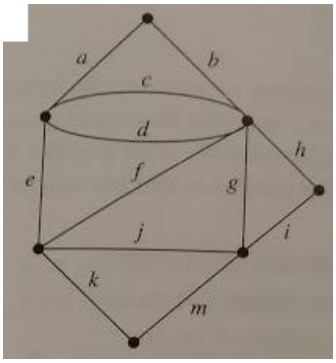
3. Let's examine the graph on the right. (Note: numbers are edge numbers again, not weights.)

a) Define the adjacency, incidence and degree matrices.

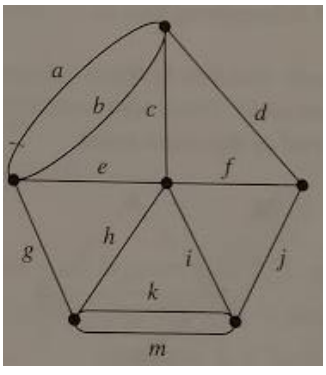
b) Define the Laplace matrix for the graph.

4. Can we find a i) Euler path ii) Euler circuit for the following graphs? Present justifications for your answers, a simple "yes/no" is not enough.

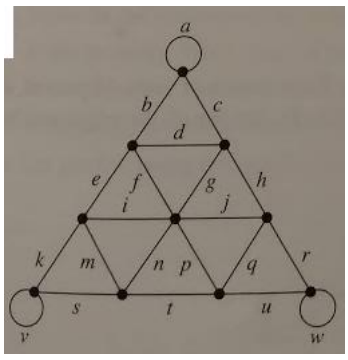
a)



b)



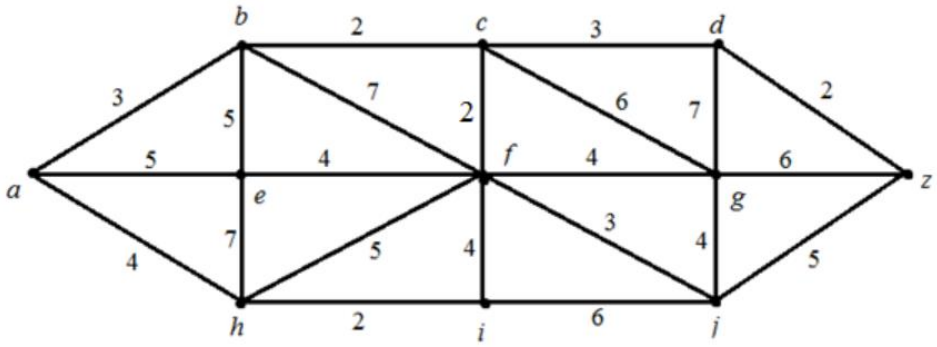
c)



5. Examine the weighted graph below.

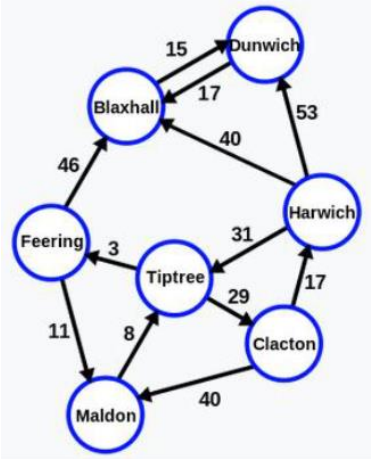
a) Formulate the adjacency matrix.

b) Solve shortest paths from node a to every other node using Dijkstra's algorithm in matrix form.



6. a) Solve the shortest paths from Clacton to every other city using Dijkstra's algorithm in matrix form. (Hint: adjacency matrix can be found directly from lectures.)

b) Use PERT and critical path analysis in order to find the minimum time in which the construction project can be completed. Table of tasks and their durations in days & preceding tasks can be found from far right.



Task	*Time*	*Preceding Tasks*
A	6	None
B	9	A, D
C	10	B, I
D	8	None
E	9	B
F	13	I
G	5	C, E, F
H	9	None
I	6	D, H

Answers/hints for selected problems:

2b: 10 *2c: 26* *6b: 33 days*

Travelling Salesman Problem