University of Limerick
Department of Mathematics and Statistics
Dr. S. Franz

OLLSCOIL LUIMNIGH
UNIVERSITY OF LIMERICK

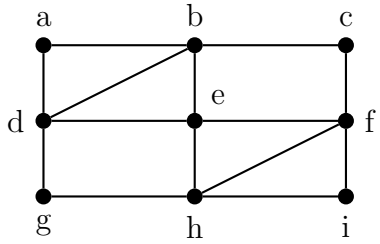
MA4016 - Engineering Mathematics 6

Problem Sheet 10: Euler, Hamilton and shortest paths

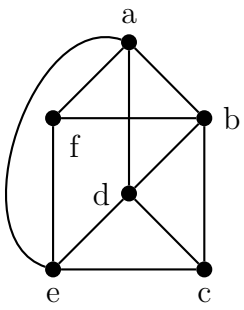
(April 16, 2010)

1. Determine whether the given graph has an Euler circuit and construct it when existent. If no Euler circuit exists, determine whether the graph has an Euler path and construct such a path if one exists.

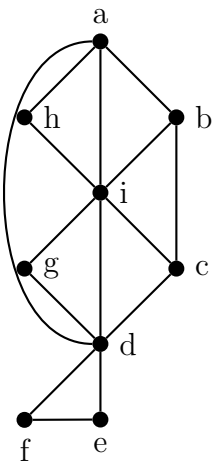
a)



b)

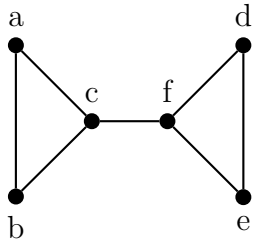


c)

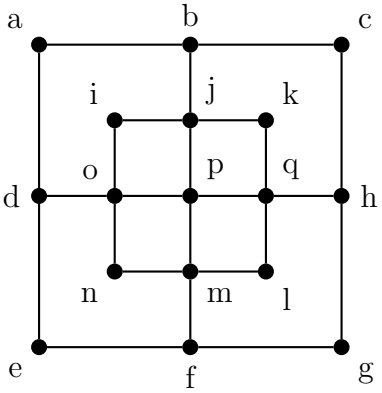


2. Determine whether the given graph has a Hamilton circuit and construct it when existent. If it does not, give an argument to show why no such circuit exists.
If no Hamilton circuit exists, determine whether the graph has a Hamilton path and construct such a path if one exists. If not, give an argument, why no Hamilton path exists.

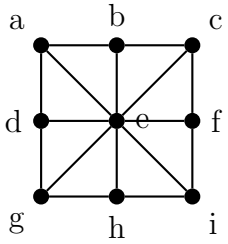
a)



b)

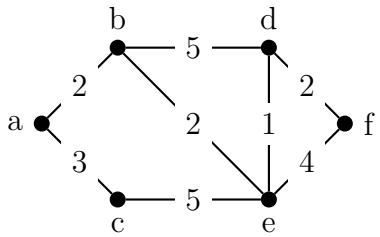


c)

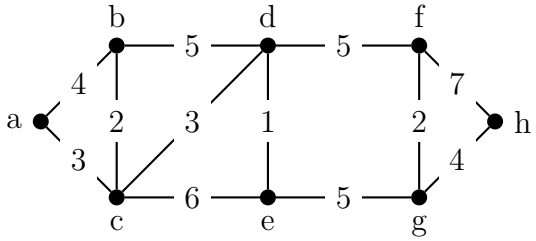


3. Find the shortest distances and shortest paths between a and all other vertices in the following graphs.

a)



b)



4. Find the shortest distances from vertex A to each of the other vertices for the following graph given by its adjacency matrix.

	A	B	C	D	E	F	G	H	I	J	K
A	-	3	-	-	5	-	-	4	-	-	-
B	3	-	2	-	5	7	-	-	-	-	-
C	-	2	-	3	-	2	6	-	-	-	-
D	-	-	3	-	-	-	7	-	-	-	2
E	5	5	-	-	-	4	-	7	-	-	-
F	-	7	2	-	4	-	4	5	4	3	-
G	-	-	6	7	-	4	-	-	-	4	6
H	4	-	-	-	7	5	-	-	2	-	-
I	-	-	-	-	-	4	-	2	-	6	-
J	-	-	-	-	-	3	4	-	6	-	5
K	-	-	-	2	-	-	6	-	-	5	-

5. Is the shortest path between two vertices in a weighted graph unique if the weights of the edges are distinct?

6. Solve the travelling salesman problem for this graph by finding the total weight of all Hamilton circuits and determining a circuit with minimum total weight (=length).