COE 444 - Internetwork Design and Management
Fall 2003 (Term 031)

Homework 9

Date: Tuesday, December 2, 2003

Q1. Given a network with six nodes, labelled 0 to 5, with node 0 being the central backbone node. The cost of having a link between any two nodes is as indicated in the following cost matrix.

	0	**1**	**2**	**3**	**4**	**5**
0	0	7	8	11	14	17
1	7	0	6	5	10	12
2	8	6	0	10	7	14
3	11	5	10	0	8	8
4	14	10	7	8	0	9
5	17	12	14	8	9	0

Each of the nodes 1 –to- 5 generates 1 unit of flow to the backbone node. Only one type of link is available which can accommodate a maximum of 3 flow units.

a. Find a feasible spanning tree using Kruskal's algorithm.

b. Find a feasible spanning tree using Esau-Williams' algorithm.

c. Discuss and compare the trees obtained with the above algorithms.

Note: For all algorithms you should show all the steps.

Q2. We would like to construct a minimum cost spanning tree connecting six workgroup switches to the main backbone switch (relay number 1). The flows from the various workgroup switches to the backbone are as follows:

Node Number	**1**	**2**	**3**	**4**	**5**	**6**
Flow in Mbps	-	10	15	5	15	10

Assume that there is a design constraint to have the flow on any link not to exceed 25 Mbps, and that the link costs are as follows:

	1	**2**	**3**	**4**	**5**	**6**
1	-	2	20	19	3	3
2	2	-	8	-	-	-
3	20	8	-	19	-	-
4	19	-	19	-	4	-
5	3	-	-	4	-	1
6	3	-	-	-	1	-

a. Use Kruskal's algorithm to construct a minimum cost feasible spanning tree.

b. Use Esau-William's algorithm to construct a minimum cost feasible spanning tree.

c. Compare the cost of the trees obtained by both heuristics. In your opinion, which heuristic is better? (You must justify your answer)

Note: For both algorithms you should show all the steps.