EE 7725 **Homework 5** **Due: 25 November 1996**

Problem 1: Show how the cells of an $m \times m$, n-stage omega network can be modified to merge a bitonic sequence of integers into a sorted sequence. That is, the i'th element of the bitonic sequence is offered to input i of the omega network (instead of a destination). The integers should appear at the outputs in ascending order. There are m^n integers in the bitonic sequence but they are not necessarily in the range $0 \cdots m^n - 1$ and are not necessarily distinct. As for the unmodified cells, the modified cells can only examine the messages passing through the cell. How does the cost of the modified cell compare to the cells in an omega network?

Problem 2: A 2×2, 4-stage omega network is to be partitioned into three parts as follows: even inputs belong to partition A, inputs 1, 3, 9, and 11 belong to partition B, and the remaining inputs belong to partition C. The network is to be partitioned so that like-numbered inputs and outputs belong to the same partition. (That is, if input i is in partition A then output i is in partition A, etc.) Show the set(s) J and permutation(s) X to achieve this partition. For each cell in the diagram below indicate whether the cell belongs to a partition and if so which partition the cell belongs to. (A cell belongs to a partition if all requests passing through it are a member of the partition.) Show how the cells are set so that B realizes permutation $\begin{pmatrix} 0 & 1 & 2 & 3 \\ 0 & 3 & 2 & 1 \end{pmatrix}$ (using partition B's numbering).