ASSIGNMENT NUMBER MX

1. Letting $a_{ij}$ and $b_{ij}$ denote the elements of row $i$ and column $j$ of matrices $A$ and $B$, respectively, the transpose of matrix $A$ is matrix $B$ with $b_{ij} = a_{ji}$. Give an algorithm to transpose a matrix represented by an MX quadtree.

2. How many interchange operations are needed to transpose an MX quadtree representation of a $2^n \times 2^n$ matrix so that it is not sparse (i.e., all blocks are of size 1)?

3. Compare the savings in space and time when a matrix is represented as an MX quadtree and as an array. Use the time required to perform a transpose operation as the basis of the comparison. You should assume the worst case, which occurs when there is no sparseness (i.e., all blocks are of size 1).