

ESc101 Laboratory Assignment

Wednesday of Week of 6/9/04

September 4, 2004

1 Matrix4x4

1.1 Problem

(i) Define class TwoVector with methods to add and to compute dot-product. (ii) Define class Matrix2x2 using two TwoVector objects as its columns. Include methods for get and set methods for elements and vectors, transpose, matrix multiplication, determinant, and add. Give all the constructors that you think suitable. (iii) Define class Matrix4x4 using four Matrix2x2 objects: M_{12}^u for $a_{11}, a_{12}, a_{21}, a_{22}$; M_{34}^u for $a_{13}, a_{14}, a_{23}, a_{24}$; M_{12}^l for $a_{31}, a_{32}, a_{41}, a_{42}$; and M_{34}^l for $a_{33}, a_{34}, a_{43}, a_{44}$. Include the methods to add, multiply, transpose, determinant computation. In each case use the appropriate methods of Matrix2x2. You can use following relation to compute the determinant. The determinant of a 4x4 matrix is $det(M_{12}^u) * det(M_{34}^l) + det(M_{12}^l) * det(M_{34}^u) - det(M_{13}^u) * det(M_{24}^l) - det(M_{13}^l) * det(M_{24}^u) + det(M_{14}^u) * det(M_{23}^l) + det(M_{14}^l) * det(M_{23}^u)$ (verify this relation). Write all appropriate constructors. (iv) Finally write a class Test with only main method. Create one 4x4 matrix M by reading 16 numbers from the user. compute the determinant of M and output it. Then compute its transpose and compute $M.M^t$ and output.