|  |  |
| --- | --- |
|  | **//Question 52 of Practice Problems 03 Arrays and Class.doc** |
|  | **// from \\tsr\Fall\CSE\CSE110\_MSA\Practice Problems\** |
|  | **public class MatrixMultiplication{** |
|  | **public static void main(String[] args){** |
|  | **// Create matrices** |
|  | **double[][] matrixA = new double[2][3];** |
|  | **double[][] matrixB = new double[3][2];** |
|  | **double[][] matrixC = new double[2][2];** |
|  |  |
|  | **// Fill Matrices** |
|  | **matrixA[0][0] = 3.0;** |
|  | **matrixA[0][1] = 2.0;** |
|  | **matrixA[0][2] = -1.0;** |
|  | **matrixA[1][0] = 0.0;** |
|  | **matrixA[1][1] = 4.0;** |
|  | **matrixA[1][2] = 6.0;** |
|  | **matrixB[0][0] = 1.0;** |
|  | **matrixB[0][1] = 0.0;** |
|  | **matrixB[1][0] = 5.0;** |
|  | **matrixB[1][1] = 3.0;** |
|  | **matrixB[2][0] = 6.0;** |
|  | **matrixB[2][1] = 4.0;** |
|  |  |
|  | **// Multiplication C =A.B** |
|  | **for(int i=0; i<2; i++){** |
|  | **for(int j=0; j<2; j++){** |
|  | **for(int k=0; k<3; k++){** |
|  | **matrixC[i][j] += matrixA[i][k]\*matrixB[k][j];** |
|  | **System.out.println(matrixC[i][j]);** |
|  | **}** |
|  | **}** |
|  | **}** |
|  | **}** |
|  | **}** |
|  |  |

**Line 25: i=0**

**Line 25: condition (i<2) is true, going to line 26**

**Line 26: j=0**

**Line 26: condition (j<2) is true, going to line 27**

**Line 27: k=0**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[0][0] \* matrixB[0][0];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 3.0 \* 1.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 3.0**

**Line 28: matrixC[i][j] = matrixC[0][0] + 3.0**

**Line 28: matrixC[i][j] = 0.0 + 3.0**

**Line 28: matrixC[i][j] = 3.0**

**Line 28: matrixC[0][0] = 3.0**

**Line 29: OUTPUT is 3.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 0<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=1**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[0][1] \* matrixB[1][0];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 2.0 \* 5.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 10.0**

**Line 28: matrixC[i][j] = matrixC[0][0] + 10.0**

**Line 28: matrixC[i][j] = 3.0 + 10.0**

**Line 28: matrixC[i][j] = 13.0**

**Line 28: matrixC[0][0] = 13.0**

**Line 29: OUTPUT is 13.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 1<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=2**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[0][2] \* matrixB[2][0];**

**Line 28: matrixC[i][j] = matrixC[i][j] + -1.0 \* 6.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + -6.0**

**Line 28: matrixC[i][j] = matrixC[0][0] + -6.0**

**Line 28: matrixC[i][j] = 13.0 + -6.0**

**Line 28: matrixC[i][j] = 7.0**

**Line 28: matrixC[0][0] = 7.0**

**Line 29: OUTPUT is 7.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 2<3**

**Line 27: Condition is true, going to line 28**

**Line 26: Condition, j<2**

**Line 26: Condition, 0<2**

**Line 26: Condition is true, going to line 27**

**Line 26: j=1**

**Line 26: condition (j<2) is true, going to line 27**

**Line 27: k=0**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[0][0] \* matrixB[0][1];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 3.0 \* 0.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 0.0**

**Line 28: matrixC[i][j] = matrixC[0][1] + 0.0**

**Line 28: matrixC[i][j] = 0.0 + 0.0**

**Line 28: matrixC[i][j] = 0.0**

**Line 28: matrixC[0][1] = 0.0**

**Line 29: OUTPUT is 0.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 0<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=1**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[0][1] \* matrixB[1][1];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 2.0 \* 3.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 6.0**

**Line 28: matrixC[i][j] = matrixC[0][1] + 6.0**

**Line 28: matrixC[i][j] = 0.0 + 6.0**

**Line 28: matrixC[i][j] = 6.0**

**Line 28: matrixC[0][1] = 6.0**

**Line 29: OUTPUT is 6.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 1<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=2**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[0][2] \* matrixB[2][1];**

**Line 28: matrixC[i][j] = matrixC[i][j] + -1.0 \* 4.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + -4.0**

**Line 28: matrixC[i][j] = matrixC[0][1] + -4.0**

**Line 28: matrixC[i][j] = 6.0 + -4.0**

**Line 28: matrixC[i][j] = 2.0**

**Line 28: matrixC[0][1] = 2.0**

**Line 29: OUTPUT is 2.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 2<3**

**Line 27: Condition is true, going to line 28**

**Line 26: Condition, j<2**

**Line 26: Condition, 1<2**

**Line 26: Condition is true, going to line 27**

**Line 25: Condition, i<2**

**Line 25: Condition, 0<2**

**Line 25: Condition is true, going to line 26**

**Line 25: i=1**

**Line 25: condition (i<2) is true, going to line 26**

**Line 26: j=0**

**Line 26: condition (j<2) is true, going to line 27**

**Line 27: k=0**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[1][0] \* matrixB[0][0];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 0.0 \* 1.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 0.0**

**Line 28: matrixC[i][j] = matrixC[1][0] + 0.0**

**Line 28: matrixC[i][j] = 0.0 + 0.0**

**Line 28: matrixC[i][j] = 0.0**

**Line 28: matrixC[1][0] = 0.0**

**Line 29: OUTPUT is 0.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 0<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=1**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[1][1] \* matrixB[1][0];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 4.0 \* 5.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 20.0**

**Line 28: matrixC[i][j] = matrixC[1][0] + 20.0**

**Line 28: matrixC[i][j] = 0.0 + 20.0**

**Line 28: matrixC[i][j] = 20.0**

**Line 28: matrixC[1][0] = 20.0**

**Line 29: OUTPUT is 20.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 1<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=2**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[1][2] \* matrixB[2][0];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 6.0 \* 6.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 36.0**

**Line 28: matrixC[i][j] = matrixC[1][0] + 36.0**

**Line 28: matrixC[i][j] = 20.0 + 36.0**

**Line 28: matrixC[i][j] = 56.0**

**Line 28: matrixC[1][0] = 56.0**

**Line 29: OUTPUT is 56.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 2<3**

**Line 27: Condition is true, going to line 28**

**Line 26: Condition, j<2**

**Line 26: Condition, 0<2**

**Line 26: Condition is true, going to line 27**

**Line 26: j=1**

**Line 26: condition (j<2) is true, going to line 27**

**Line 27: k=0**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[1][0] \* matrixB[0][1];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 0.0 \* 0.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 0.0**

**Line 28: matrixC[i][j] = matrixC[1][1] + 0.0**

**Line 28: matrixC[i][j] = 0.0 + 0.0**

**Line 28: matrixC[i][j] = 0.0**

**Line 28: matrixC[1][1] = 0.0**

**Line 29: OUTPUT is 0.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 0<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=1**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[1][1] \* matrixB[1][1];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 4.0 \* 3.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 12.0**

**Line 28: matrixC[i][j] = matrixC[1][1] + 12.0**

**Line 28: matrixC[i][j] = 0.0 + 12.0**

**Line 28: matrixC[i][j] = 12.0**

**Line 28: matrixC[1][1] = 12.0**

**Line 29: OUTPUT is 12.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 1<3**

**Line 27: Condition is true, going to line 28**

**Line 27: k=2**

**Line 27: condition (k<3) is true, going to line 28**

**Line 28: matrixC[i][j] += matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[i][k] \* matrixB[k][j];**

**Line 28: matrixC[i][j] = matrixC[i][j] + matrixA[1][2] \* matrixB[2][1];**

**Line 28: matrixC[i][j] = matrixC[i][j] + 6.0 \* 4.0**

**Line 28: matrixC[i][j] = matrixC[i][j] + 24.0**

**Line 28: matrixC[i][j] = matrixC[1][1] + 24.0**

**Line 28: matrixC[i][j] = 12.0 + 24.0**

**Line 28: matrixC[i][j] = 36.0**

**Line 28: matrixC[1][1] = 36.0**

**Line 29: OUTPUT is 36.0**

**Line 27: Condition, k<3**

**Line 27: Condition, 2<3**

**Line 27: Condition is true, going to line 28**

**Line 26: Condition, j<2**

**Line 26: Condition, 1<2**

**Line 26: Condition is true, going to line 27**

**Line 25: Condition, i<2**

**Line 25: Condition, 1<2**

**Line 25: Condition is true, going to line 26**