1.5 Transverse 2D Array

In my video, I will show

- 2D Array
- Methods (or functions)

- 3x3 Matrix Addition Method
  - 3x3 Subtraction Method
  - 3x3 Scalar multiplication Method
- Pass Inputs into a Method
- Return 2D Array
- Nested For-Loops
- Show X= 2A-0.5B+4C

- 3x3 Matrix Addition Method

$$A\begin{bmatrix} 0 & 2 & -1 \\ -2 & 0 & -4 \\ 1 & 4 & 0 \end{bmatrix} + B\begin{bmatrix} 0 & 2 & -1 \\ -2 & 0 & -1 \\ 1 & 1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 4 & -2 \\ -4 & 0 & -5 \\ 2 & 5 & 0 \end{bmatrix}$$

- 3x3 Subtraction Method

$$\begin{pmatrix} 1 & 3 & 4 \\ 2 & 5 & 6 \\ 4 & 3 & 2 \end{pmatrix} - \begin{pmatrix} 2 & 7 & 1 \\ 0 & 4 & 6 \\ 9 & 8 & 1 \end{pmatrix} = \begin{pmatrix} 1-2 & 3-7 & 4-1 \\ 2-0 & 5-4 & 6-6 \\ 4-9 & 3-8 & 2-1 \end{pmatrix}$$

- 3x3 Scalar multiplication Method

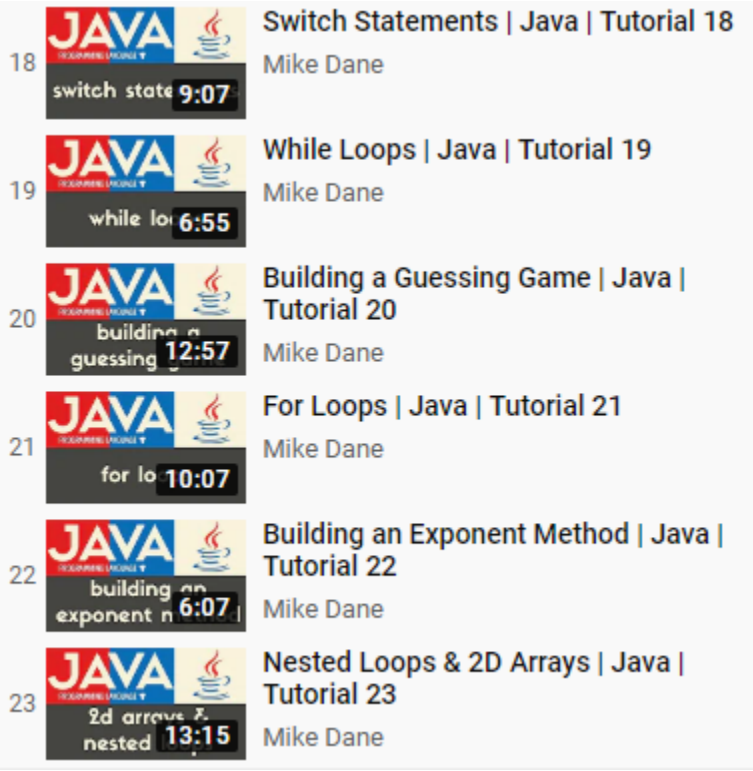
$$2A = 2 \cdot \begin{bmatrix} -5 & 2 & 0 \\ 7 & -3 & 4 \\ -1 & 3 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 2(-5) & 2(2) & 2(0) \\ 2(7) & 2(-3) & 2(4) \\ 2(-1) & 2(3) & 2(2) \end{bmatrix}$$

$$2A = \begin{bmatrix} -10 & 4 & 0 \\ 14 & -6 & 8 \\ -2 & 6 & 4 \end{bmatrix}$$

1.5 Array, Method and For Loop

- Watch new videos.
- Make sure you understand everything in Video 23
- https://www.youtube.com/watch?v=QneahuoJ41A&list=PLFpPpdR_9IQBUDLjYalvdrGGb&index=18
- Type and run every code in the videos.



Example

- Post HW15

in your Youtube playist

```java
package homework;

public class HW15 {

    public static void main(String[] args) {
        double[][] matA = {{1,2,3},{4,5,7},{7,8,11}} ;
        double[][] matB = {{10,20,30},{40,50,70},{70,80,110}};
        double[][] matC = {{0,0,0},{0,0,0},{0,0,0}};

        matC= addMat(matA, matB);

        System.out.println("Return 2D Array");
        System.out.println("C = A + B");

        for(int i=0; i < matA.length; i++) {
            for(int j=0; j < matB[i].length; j++) {
                    System.out.print(matC[i][j] + " ");
            }
            System.out.println("");
        }
    }


    public static double[][] addMat(double[][] matA,double[][] matB ) {
        double[][] matC ={{0,0,0},{0,0,0},{0,0,0}};

        for(int i=0; i < matA.length; i++) {
            for(int j=0; j < matA[i].length; j++) {
                    matC[i][j]=matA[i][j]+matB[i][j];
            }
        }
        return matC;
    }
```

Console

```
<terminated> HW15 [Java Application] C:\Program Files\AdoptOpenJDK\jdk-11.0.4.11-hotspot\bin\javaw.exe (S
Return 2D Array
C = A + B
11.0 22.0 33.0
44.0 55.0 77.0
77.0 88.0 121.0
```

(Optional) MxN Matrix

- MxN Addition
- MxN matrix Multiplication
- MxM Inverse Matrix : Extra Credit 
- MxN Scalar Multiplication
- Error exception routines : Mat(3x4) +Mat(3x5)