Date: 24/09/2016
A2/Online/Operator Overloading

Problem #1
Matrix Operations

In this problem you need to implement a class to represent a matrix as follows:

Private information:

- Store row and column size of the matrix in 2 private variables.
- Keep a 2D array to store the matrix. Length of the array in each dimension should be 20 units.

Public information:

- Write a constructor that takes the row and column size as input. Update your private members so that all the elements of the matrix of the specified size become 0.
- Write a method to set all the elements of a specific row. The prototype should look like:
  `void SetRow(int rowId, int val[])`
- Write a method to print the matrix. If the matrix is an invalid matrix (e.g. row and/or col. size is 0), then print "INVALID MATRIX!!!".
- Overload the following operators
  - + (Addition)
  - – (Subtraction)
  - Unary – (Negation)
  - * (Multiplication)

Write the class as described above so that the following code in the main function works perfectly with your class.

```
int main()
{
    int x[][3] = {
        1, 2, 3,
        4, 5, 6
    };

    int y[][3] = {
        7, 8, 9,
        10, 11, 12
    };

    int z[][2] = {
        7, 8,
        9, 10,
        11, 12
    };

    Matrix a(2, 3);
    a.SetRow(0, x[0]);
    a.SetRow(1, x[1]);

    Matrix b(2, 3);
    b.SetRow(0, y[0]);
```

```
    b.SetRow(1, y[1]);

    Matrix c(3, 2);
    c.SetRow(0, z[0]);
    c.SetRow(1, z[1]);
    c.SetRow(2, z[2]);

    cout << "A:" << endl;
    a.Print();

    cout << "-A:" << endl;
    (-a).Print();

    cout << "B:" << endl;
    b.Print();

    cout << "C:" << endl;
    c.Print();

    cout << "A + B:" << endl;
    (a + b).Print();

    cout << "A + C:" << endl;
    (a + c).Print();

    cout << "A - B:" << endl;
    (a - b).Print();

    cout << "A * C:" << endl;
    (a * c).Print();

    getch();
    return 0;
}
```

The corresponding output should be like this

```
A:
2 3
1 2 3
4 5 6

-A:
2 3
-1 -2 -3
-4 -5 -6

B:
2 3
7 8 9
10 11 12

C:
3 2
7 8
9 10
11 12

A + B:
2 3
8 10 12
14 16 18

A + C:
INVALID MATRIX!!!

A - B:
2 3
-6 -6 -6
-6 -6 -6

A * C:
2 2
58 64
139 154
```