Programming Assignment – #2

Submit your assignment as a report. You need to do the following for each of the problems to get full points.

1) Program listing with line numbers. [15 points]
2) Create at least 5 test cases and report their output. [5 points]

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1. Quadratic Equation [20 points]

Design and write a Java code that solves a quadratic equation $ax^2 + bx + c = 0$. Please use class and object definitions and do not use procedural style.

Let the roots of $ax^2 + bx + c = 0$ be p and q. Show that the following:

$$p + q = -\frac{b}{a},$$

and

$$pq = \frac{c}{a},$$

for non-trivial of values of a, b, c. Make sure that you address that complex numbers as objects.

2. Matrix Operations [20 points]

You will create a general **M**x**N** matrix where **M** = number of rows and **N** = number columns that are specified by the user. Write a generic class of matrix that accepts user-defined N and M as input parameters and generates a random matrix. Each cell of the matrix is a random number.

Example 1: Consider a 2x2 matrix: A = $\begin{pmatrix} 23 & 54 \\ 98 & 97 \end{pmatrix}$ where A[i][j] is a random number between (0,99).

Example 2: Consider a 3x3 matrix A = $\begin{pmatrix} 54 & 43 & 76 \\ 12 & 98 & 34 \\ 38 & 43 & 62 \end{pmatrix}$ where A[i][j] is a random number between (0,99).

Thus generate a random matrix **A**. Similarly you can generate matrices of other dimensions by specifying user values **M** and **N** . Perform your operations on these matrices.

Design and write Java codes that solves the following:

- Matrix **Addition** (2x2, 3x5)
- Matrix **Multiplication** (2x2, 3x5)

Show your results with your set of examples. You are free to choose the values of M and N