Chapter 02 Assignments (Medium difficulty)

Here are some assignments for working with matrices (2D arrays)

1. Write a Java program that takes two matrices A and B and multiplies them using matrix multiplication. Print the resulting matrix. Example:

   A = {{1, 2, 3}, {4, 5, 6}}

   B = {{7, 8}, {9, 10}, {11, 12}}

   Result: {{58, 64}, {139, 154}}

2. Write a Java program that takes a matrix A and finds the determinant of the matrix. Example:

   A = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}}

   Result: 0

3. Write a Java program that takes a matrix A and finds the transpose of the matrix. Example:

   A = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}}

   Result: {{1, 4, 7}, {2, 5, 8}, {3, 6, 9}}

4. Write a Java program that takes a matrix A and checks if it is symmetric or not. Example:

   A = {{1, 2, 3}, {2, 5, 6}, {3, 6, 9}}

   Result: Symmetric

5. Write a Java program that takes a matrix A and finds the inverse of the matrix. Example:

   A = {{4, 7}, {2, 6}}

   Result: {{-1.5, 1.1666666666666667}, {0.5, -0.6666666666666666}}

6. Write a Java program that takes a matrix A and finds the rank of the matrix. Example:

   A = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}}

   Result: 2

7. Write a Java program that takes a matrix A and finds the eigenvalues and eigenvectors of the matrix. Example:

   A = {{2, 0, 1}, {0, 1, 0}, {1, 0, 2}}

   Result: Eigenvalues: {1, 2, 2} Eigenvectors: {{0.707, -0.707, 0}, {0, 0, 1}, {-0.707, -0.707, 0}}

8. Write a Java program that takes two matrices A and B and adds them. Print the resulting matrix. Example:

A = {{1, 2, 3}, {4, 5, 6}}

B = {{7, 8, 9}, {10, 11, 12}}

Result: {{8, 10, 12}, {14, 16, 18}}

9. Write a Java program that takes two matrices A and B and subtracts them. Print the resulting matrix. Example:

A = {{1, 2, 3}, {4, 5, 6}}

B = {{7, 8, 9}, {10, 11, 12}}

Result: {{-6, -6, -6}, {-6, -6, -6}}

10. Write a Java program that takes a matrix A and finds the sum of its diagonal elements. Example:

A = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}}

Diagonal sum: 15