Assignment - 1
CS0557 - Cryptography Laboratory

Name: Vikas Pundir
Roll No: 25203112
Section: MTech CSE(IS) First Year
Date: 26 August 2025

Question 1: Write a program to print all prime numbers between 1 and 1000.

```
public class Prime {
   public static void main(String[] args) {
      for (int i = 2; i <= 1000; i++) {
         boolean isPrime = true;
         for (int j = 2; j < i; j++) {
            if (i % j == 0) {
               isPrime = false; break;
            }
         }
         if (isPrime) {
            System.out.print(i + " ");
         }
      }
   }
}
```

Output :

```
Prime x

"C:\Program Files\Java\jdk-24\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA Community Edition 2025.2\lib\idea_rt.jar=50296" -Dfile.encoding=UTF-8
 -Dsun.stdout.encoding=UTF-8 -Dsun.stderr.encoding=UTF-8 -classpath "C:\Users\vikas\Desktop\sem 1\CRYPTOGRAPHY LAB\LAB 1\out\production\LAB 1" Prime
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97 101 103 107 109 113 127 131 137 139 149 151 157 163 167 173 179 181 191 193 197 199 211 223 227 229
 233 239 241 251 257 263 269 271 277 281 283 293 307 311 313 317 331 337 347 349 353 359 367 373 379 383 389 397 401 409 419 421 431 433 439 443 449 457 461 463 467 479 487
  491 499 503 509 521 523 541 547 557 563 569 571 577 587 593 599 601 607 613 617 619 631 641 643 647 653 659 661 673 677 683 691 701 709 719 727 733 739 743 751 757 761
 769 773 787 797 809 811 821 823 827 829 839 853 857 859 863 877 881 883 887 907 911 919 929 937 941 947 953 967 971 977 983 991 997
Process finished with exit code 0
```

Question 2: Write a program to perform matrix multiplication.

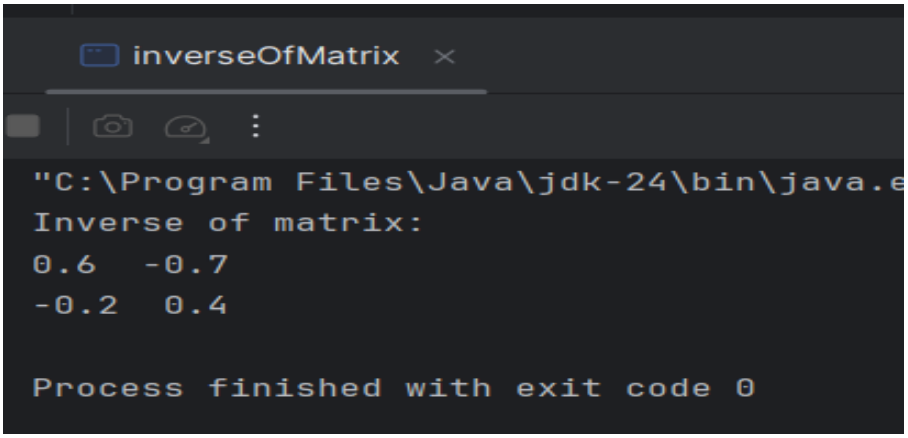
```
public class matrixMultiplication {
   public static void main(String[] args) { int
      [][] A = {{1,2}, {3,4}};
      int [][] B = {{1,2}, {3,4}};
      int rowA = A.length; int colA =
      A[0].length; int rowB =
      B.length; int colB =
      B[0].length;

      if(colA != rowB){
         System.out.println("PLEASE ENTER 2 VALID MATRIX FOR MULTIPLICATION");
         return;
      }

      int [][] result = new int[rowA][colB]; for
      (int i = 0; i < rowA; i++) {
         for (int j = 0; j < colB; j++) {
            for (int k = 0; k < colA; k++) { result[i][j] +=
               A[i][k] * B[k][j];
            }
         }
      }

      for (int i=0; i< rowA ; i++){
         for (int j = 0; j< colB; j++){
            System.out.print(result[i][j] + " ");
         }
         System.out.println();
      }
   }
}
```

Output:



Question 3: Write a program to find the inverse of a 3x3 matrix using adjoint and determinant method.

```
public class InverseMatrix3x3 {
   public static void main(String[] args) {
      double[][] A = {
         {1, 2, 3},
         {0, 1, 4},
         {5, 6, 0}
      };

      double det = determinant(A);

       if (det == 0) {
         System.out.println("Matrix is singular, inverse does not exist.");
         return;
      }

      double[][] adj = adjoint(A); double[][]
      inverse = new double[3][3];

      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) { inverse[i][j] =
            adj[i][j] / det;
         }
      }

      System.out.println("Inverse Matrix:"); for
      (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
            System.out.printf("%.2f ", inverse[i][j]);
         }
         System.out.println();
      }
   }

   static double determinant(double A[][]) {
          return A[0][0]*(A[1][1]*A[2][2] - A[1][2]*A[2][1])
               - A[0][1]*(A[1][0]*A[2][2] - A[1][2]*A[2][0])
               + A[0][2]*(A[1][0]*A[2][1] - A[1][1]*A[2][0]);
   }

   static double[][] adjoint(double A[][]) { double[][]
      adj = new double[3][3];
      adj[0][0] =  (A[1][1]*A[2][2] - A[1][2]*A[2][1]);
      adj[0][1] = -(A[1][0]*A[2][2] - A[1][2]*A[2][0]);
      adj[0][2] =  (A[1][0]*A[2][1] - A[1][1]*A[2][0]);

      adj[1][0] = -(A[0][1]*A[2][2] - A[0][2]*A[2][1]);
      adj[1][1] =  (A[0][0]*A[2][2] - A[0][2]*A[2][0]);
      adj[1][2] = -(A[0][0]*A[2][1] - A[0][1]*A[2][0]);

      adj[2][0] =  (A[0][1]*A[1][2] - A[0][2]*A[1][1]);
      adj[2][1] = -(A[0][0]*A[1][2] - A[0][2]*A[1][0]);
      adj[2][2] =  (A[0][0]*A[1][1] - A[0][1]*A[1][0]);

      // transpose of cofactor matrix

      for (int i = 0; i < 3; i++) {
         for (int j = i+1; j < 3; j++) { double
            temp = adj[i][j]; adj[i][j] =
            adj[j][i]; adj[j][i] = temp;
         }
      }
      return adj;
   }
```

Output:

```
inverseOfMatrix

"C:\Program Files\Java\jdk-24\bin\java.exe"
Inverse of matrix:
0.6  -0.7
-0.2  0.4

Process finished with exit code 0
```

*****