ESC101 : Fundamental of Computing
Mock Lab Test for 18th September 2008

Instructions:

1. The duration of the test is 3 hrs (from **2:00 pm to 5:00 pm**).
2. **Directory Structure:** Create a directory and name it with your roll number. For example, if your roll number is $Y8001$, the directory should be named $Y8001$ (`Y` should be upper case). Create two files inside this directory: $DiffPrime.java$ and $SepcialPrime.java$.
3. Please use *meaningful* identifiers for variables and methods. Use comments to improve readability of the program. Properly indent your code. Otherwise some marks may get deducted irrespective of whether your program is correct.

Problems:

1. **Difference Between Two Primes:**

   Write a JAVA program to find the difference between the nth prime number and $(n+k)$th prime number for a given pair of a positive integers n and k. For example, if the input value of $n = 2$ and $k = 3$, then the output should be 8 because the 2nd prime number is 3 and 5th prime number is 11.

   Note: The input n and k must be taken from command line in this order.

2. **Special prime**
   Write a program which for an integer n computes and prints the smallest integer $m > n$ satisfying all the following conditions simultaneously.

   - m is prime.
   - m is of the form $3t + 1$ for some positive integer t.
   - m is also of the form $a^2 + b^2 - ab$ for some positive integers a, b.

   For example,
   For input $n = 5$, the number m is 7 since 7 is prime, $7 = 3 \times 2 + 1$ and $7 = 3^2 + 1^2 - 3 \times 1$.
   For input $n = 17$, the number m is 19 since 19 is prime, $19 = 3 \times 6 + 1$ and $19 = 5^2 + 3^2 - 5 \times 3$.

   Note: The input n must be taken from command line.