Problem Set 2 Exercise #21: Legendre's Conjecture

Reference: Lecture 4 notes

Learning objectives: Modular design; Writing Boolean methods

Estimated completion time: 50 minutes

Problem statement:

[Past year CS1101c sit-in lab question]

Legendre's conjecture (proposed by Adrien-Marie Legendre in 1912) states that there is at least one prime number in the range $[n^2, (n + 1)^2]$ for every positive integer n.

Write a program **PS2_Ex21_Legendre.java** to test Legendre's conjecture over a range of numbers from 1 up to the input number n. This means if the input is 4, you should check that there is at least one prime between 1^2 and 2^2, and at least one prime between 2^2 and 3^2, and at least one prime between 3^2 and 4^2, and at least one prime between 4^2 and 5^2.

You need to write a modular program. Besides the **`main()`** method, there should be at least another method that computes some result.

Useful tips:

Clear and neat logic is expected in this exercise. Spend some time on design. What are the sub-problems you have identified? What's their relationship (e.g. which module use some other module)? What is the sequence of method calls to derive the output?

Sample run #1:

```
Enter n: 4
true
```

Sample run #2:

```
Enter n: 15
true
```