The Problem

The program you are going to write will work with prime numbers. There are two parts to the program.

- The program will prompt for the user to input a “large” integer. A “large” integer can be up to 19 decimal digits long, up to the value 9,223,372,036,854,775,807, the largest positive integer value allowed by a long variable in Java. The program will determine if this integer is prime and report accordingly.

- If this integer is not prime, it will perform the computation to determine the nearest integer that is prime. It will tell us what this nearest prime is. If there are two nearest primes, it will print both.

Here are some examples of how the program should work.

- If we ask the program if 13 is prime, it will return yes.
- If we ask the same program if 22 is prime, it will say no; it will also tell us that 23 is the nearest prime.
- As a third example, if we ask this program if 15 is prime, it will say no; it will add that the two nearest primes are 13 and 17.

Of course, these examples deal with small integers so that we can understand what’s going on, but our program must be able to deal with large integers as well.

What to hand in

To be able to solve a problem by programming, we first need to think of a way to solve the problem. This provides us with the foundation to write the necessary program. Then, you need to also explain what your program does and what output it produces. So, this is what I would like for you to do.

1. Write one or more paragraphs describing your approach to solving the problem.
2. Please take a screenshot of your console, to give us an idea of what your program accomplishes. You should include the screenshot with your write-up. Describe it briefly so we understand what it contains.
<table>
<thead>
<tr>
<th>Run</th>
<th>Input</th>
<th>Is prime</th>
<th>Nearest prime(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>22</td>
<td>no</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>no</td>
<td>13, 17</td>
</tr>
</tbody>
</table>

Table 1: List of integers tested for primality, with nearest integers as appropriate

3. Run your program at least 10 times with different inputs and provide the results that the program returns in a table. The table should look like Table 1. Explain the contents of the table briefly.

4. Please write your document using the US letter format given at [http://www.ieee.org/conferences_events/conferences/publishing/templates.html](http://www.ieee.org/conferences_events/conferences/publishing/templates.html). This is the IEEE Conference style.

5. Include the Java program and the document in a folder, zip it and upload the zipped file to Blackboard or mail it to me.