1. Write a Java method that:
   - Accepts an integer n as input.
   - Uses a for loop to check whether n is prime.
   - Returns `"Prime"` if n is prime, otherwise returns `"Not Prime"`.

   Analyze the time complexity of your solution

2. Explain the error in the following word and correct it.

```
public class TypingExample {
  public static void main(String[] args) {
    int num = 10;
    num = "Hello"; // Identify and fix the error
  }
}
```

3.

```
class Data {
  int value;
}

public class MemoryTest {
  public static void main(String[] args) {
    Data obj1 = new Data();
    Data obj2 = new Data();
    obj1.value = 10;
    obj2.value = 20;
    obj1 = obj2;
    obj2.value = 30;
    System.out.println(obj1.value);
  }
}
```

   a. What is the output of the code?
   b. Explain how memory is allocated (stack vs heap)
   c. What happens to the object initially referenced by `obj1` after assignment?

4. A software developer is working on a Java-based **real-time data processing system**. The system processes sensor data and maintains various statistics. Consider the following three variables used in different parts of the system:
   - **Instance Variable**: `double currentReading;`
     Stores the latest sensor reading for an individual sensor object.
   - **Static Variable**: `static int totalReadings;`
     Tracks the total number of sensor readings processed across all sensors in the system.
   - **Local Variable**: `double averageReading;`
     Used inside a method to compute the **average of the last 10 sensor readings** and is reset every time the method is called.

   a. Explain why *currentReading* should be an instance variable instead of static.
   b. Why must *averageReading* be a local variable instead of an instance or static variable?
   c. What would happen if *totalReadings* were an instance variable instead of static? How would that impact data processing across multiple sensors?
   d. Suppose the system crashes unexpectedly. Which variables (*currentReading*, *totalReadings*, or *averageReading*) will retain their last recorded value when the system restarts? Explain why.
   e. If the developer wants to track the highest sensor reading ever recorded across all sensors, which type of variable should be used? Justify your answer.