The Fourth Program: Gauss

Start a new project called “Gauss” and enter the following program:

```java
/**
   * Date   Name     Program "Gauss" to add the first one hundred
   *          integers.
   */

public class Gauss {
   public static void main(String[] args) {
      int sum = 0;
      for(int i = 0; i <= 100; i++) {
         sum += i;
         System.out.println(sum);
      }
   }
}
```

As you might expect, you run the program by hitting the Execute button (then fixing typos, of course). In a more sophisticated environment one would run the program with the command

```
> java Gauss
```

Try the following experiments.

1. Change the 100 to 200. What happens?

2. Change the 100 to 1000, but before you run the program also change it so that it only prints out the sum and does not print out each step along the way. (You don’t want to see it print a list of 1000 steps!)

3. How large a number can you put in place of 100 and have the program still work? Does it work with 1000? 5000?

4. Change the number 100 to the expression `Integer.parseInt(args[0])`. Type in an integer as the argument when you run the program. Run the program with several integer inputs.

5. Change the variable name `sum` to `harry` everywhere that it occurs. Will the program still work? Why do you think `sum` is a better name for the variable than `harry`?

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6. Change the program to compute **factorials**, that is, **multiply** the first numbers rather than add. (The multiplication operation in **Java** is represented by `*`.) Use it to compute 10 factorial. Can you compute 11 factorial? How about 17 factorial? (Is the answer believable?)

7. Change every occurrence of the keyword **int** to **long** and try again. How large a factorial can you compute now? Change the program to compute, in a **for loop** each factorial from 1 to 30. Does it work?

After you have successfully built the projects **HelloWorld**, **EchoArgs**, and **Gauss**, try to write programs to solve some of the following problems.