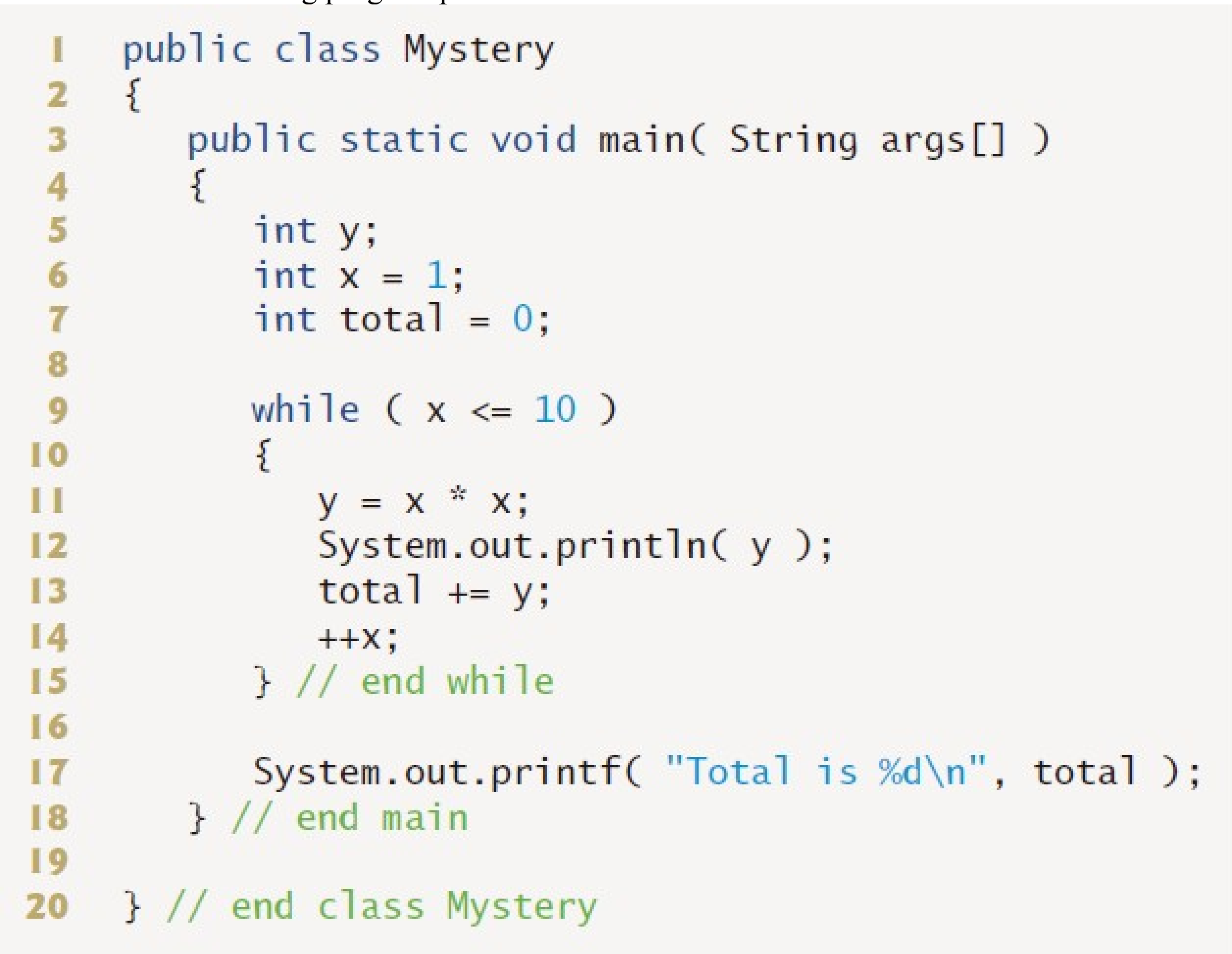
W3101-1 Programming Languages: Java
Assignment #1 Due: March 2 11.59pm (Monday)

1) What does the following program print?



```
public class Mystery
{
   public static void main( String args[] )
   {
      int y;
      int x = 1;
      int total = 0;

      while ( x <= 10 )
      {
         y = x * x;
         System.out.println( y );
         total += y;
         ++x;
      } // end while

      System.out.printf( "Total is %d\n", total );
   } // end main

} // end class Mystery
```

2) Determine the output for each of the given sets of code when x is 9 and y is 11 and when x is 11 and y is 9. Note that the compiler ignores the indentation in a Java program. Also, the Java compiler always associates an else with the immediately preceding if unless told to do otherwise by the placement of braces ({}). On first glance, the programmer may not be sure which if an else matches—this situation is referred to as the "dangling-else problem." We have eliminated the indentation from the following code to make the problem more challenging. [Hint: Apply the indentation conventions you have learned.]

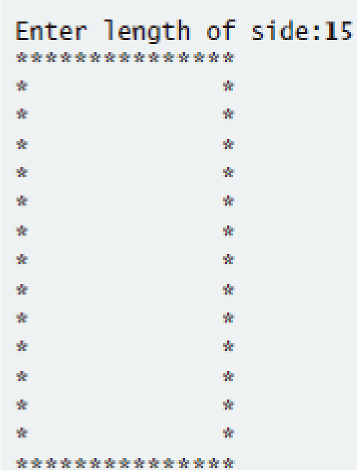
a)

```
if ( x < 10 )
if ( y > 10 )
System.out.println( "*****" );
else
System.out.println( "#####" );
System.out.println( "$$$$$" );
```

b)

```
if ( x < 10 )
{
if ( y > 10 )
System.out.println( "*****" );
}
else
{
System.out.println( "#####" );
System.out.println( "$$$$$" );
}
```

3) Write an application (Square.java) that prompts the user to enter the size of the side of a square, then displays a hollow square of that size made of asterisks. Your program should work for squares of all side lengths between 1 and 20. An example output for 15.



```
Enter length of side:15
***************
*             *
*             *
*             *
*             *
*             *
*             *
*             *
*             *
*             *
*             *
*             *
*             *
*             *
***************
```

4) The factorial of a nonnegative integer n is written as n! (pronounced “n factorial”) and is defined as follows:

$n! = n \cdot (n - 1) \cdot (n - 2) \cdot \ldots \cdot 1$ (for values of $n$ greater than or equal to 1)

and

$n! = 1$ (for $n = 0$)

For example, 5! = 5 · 4 · 3 · 2 · 1, which is 120.

Write an application (Factorial.java) that reads a nonnegative integer and computes and prints its factorial. An example scenario

```
Enter a positive Integer: 14
14! is 1278945280
```

5) Write an application (Decimal.java) that inputs an integer containing only 0s and 1s (i.e., a binary integer) and prints its decimal equivalent. [Hint: Use the remainder and division operators to pick off the binary number’s digits one at a time, from right to left. In the decimal number system, the rightmost digit has a positional value of 1 and the next digit to the left has a positional value of 10, then 100, then 1000, and so on. The decimal number 234 can be interpreted as 4 * 1 + 3 * 10 + 2 * 100. In the binary number system, the rightmost digit has a positional value of 1, the next digit to the left has a positional value of 2, then 4, then 8, and so on. The decimal equivalent of binary 1101 is 1 * 1 + 0 * 2 + 1 * 4 + 1 * 8, or 1 + 0 + 4 + 8 or, 13.] An example scenario

```
Enter a binary number: 11000000
Decimal is: 192
```