Exercises: Loops

Code Reading

1. What is the output of the following program?

```
String alpha = "abcdefg";

for(int i = 3; i < alpha.length(); i++) {
    System.out.println(alpha.charAt(i));
}
```

Solution:

```
defg
```

2. What is the output of the following program?

```
int i = 9;

while (i < 21) {
    System.out.println(i);
    i += i / 4;
}
```

Solution:

```
9
11
13
16
20
```

3. What is the output of the following program?

```
String alpha = "Yet another sentence another example to read";

while(alpha.indexOf(' ') > -1) {

    String word = alpha.substring(0, alpha.indexOf(' '));

    if (word.length() > 6) {
        System.out.print(word + " ");
    } else {
        for(int i = 0; i < word.length(); i++) {
            System.out.print("_");
        }

        System.out.print(" ");
    }

    alpha = alpha.substring(alpha.indexOf(' ') + 1, alpha.length());
}
```

Solution:

```
___ another sentence another example __ ____
```

4. What is the output of the following program?

```
int value = 2;

do {

    if (value == 2 || value == 6) {
        System.out.println("*");
    } else if (value == 3 || value == 9 || value == 10) {
        System.out.print(value + " ");
    } else {
        System.out.print((value*2) + " ");
    }

    value++;

} while (value < 10);
```

Solution:

```
*
3 8 10 *
14 16 9 10
```

Code Writing

5. Write a loop that prints the numbers 1-10.

Solution:

```
for (int i = 1; i <= 10; i++) {
    System.out.println(i);
}
```

6. Write a loop that prints the numbers 0-9.

Solution:

```
for (int i = 0; i < 10; i++) {
    System.out.println(i);
}
```

7. Write a loop that prints the first 10 even numbers (0, 2, 4, ..., 16, 18).

Solution:

```
for (int i = 0; i < 10; i++) {
    System.out.println(i*2);
}
```

8. Write a loop that prints the first n even numbers (assume that a variable `n` of type `int` has been defined for you). (*Hint:* Think how you can modify the loop from the previous question.)

Solution:

```
for (int i = 0; i < n; i++) {
    System.out.println(i*2);
}
```

9. Write a loop that prints the next 10 even numbers starting from n (you may assume that n has been defined and is an even number). For example, if n was 4, you would print 4, 6, 8, ..., 20, 22.

Solution:

```
for (int i = 0; i < 10; i++) {
    System.out.println((i*2) + n);
}
```

10. Write a loop that prints the first 10 multiples of some given number n (you may assume that n has been defined). For example, if n is 3, your loop should print 3, 6, 9, ..., 24, 27, 30.

Solution:

```
for (int i = 1; i <= 10; i++) {
    System.out.println(i*n);
}
```

11. Write a loop that sums together the numbers 1 through 10 and prints the result at the end of the loop.

Solution:

```
int sum = 0;

for (int i = 1; i <= 10; i++) {
    sum += i;
}

System.out.println(sum);
```

12. Write a loop that calculates 10! (10 factorial, defined as $10! = 10 * 9 * 8 * \ldots * 2 * 1$) and prints the result at the end of the loop.

Solution:

```
int product = 1;

for (int i = 1; i <= 10; i++) {
    product *= i;
}

System.out.println(product);
```

13. Write a program that prints a block of stars with the same width/height, as defined in the variable `int widthHeight`. Below is an example for `widthHeight = 5`.

```
*****
*****
*****
*****
*****
```

Solution:

```
int widthHeight = //some value - assume this is set for you

for(int row = 0; row < widthHeight; row++) {
    for(int col = 0; col < widthHeight; col++) {
        System.out.print("*");
    }
    System.out.println();
}
```

14. Write a program that prints a patchwork of stars with the same width/height, as define in the variable `int widthHeight`. The very first printed character should always be a star. Below is an example for `widthHeight = 5`.

```
* * *
 * *
* * *
 * *
* * *
```

Solution:

```
int widthHeight = //some value - assume this is set for you
boolean printStar = true;

for(int row = 0; row < widthHeight; row++) {
    for(int col = 0; col < widthHeight; col++) {
        if(printStar) {
            System.out.print("*");
        }

        printStar = !printStar;
    }
    System.out.println();
}
```