## 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));
}
```

2. What is the output of the following program?
```
int i = 9;
while (i < 21) {
    System.out.println(i);
    i += i / 4;
}
```

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());
}
```

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);
```


## Code Writing

5. Write a loop that prints the numbers 1-10.
6. Write a loop that prints the numbers 0-9.
7. Write a loop that prints the first 10 even numbers $(0,2,4, \ldots, 16,18)$.
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.)
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 $4,6,8, \ldots, 20,22$.
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 $3,6,9, \ldots, 24,27,30$.
11. Write a loop that sums together the numbers 1 through 10 and prints the result at the end of the loop.
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.
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 $=5$.
```
*****
*****
*****
*****
*****
```

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 $=5$.
```
* * *
    * *
* * *
    * *
* * *
```

