

Exercise 1

1. Given two variables, `value1` and `value2`, write a Java program that exchanges the values of each variables.

2. Prove that the following expression is equivalent to `true`

`(!(a && b) && (a || b)) || ((a && b) || !(a || b))`

3. Read the following expression and simplify it as much as possible:

`(!(a < b) && !(a > b))`

4. Write a Java program that shows what happens when you calculate the following expressions:

```
10/3
10/3.0
10.0/3
10.0/3.0
10%3
```

5. What do each of the following print?

- a. `System.out.println('b');`
- b. `System.out.println('b' + 'c');`
- c. `System.out.println((char) ('a' + 4));`
- d. `System.out.println((char) 97);`
- e. `System.out.println(0x61);`
- f. `System.out.println((char) 0x61);`

6. Write a Java program that spells out your name using the ASCII code table, similar to 5(d) above. Make sure you have upper and lower case letters covered.

An ASCII table with decimal, hex, octal and char can be found here:

<http://www.asciitable.com>

7. Write a Java program that prints the following constants.

- a. `Short.MIN_VALUE` and `Short.MAX_VALUE`
- b. `Integer.MIN_VALUE` and `Integer.MAX_VALUE`
- c. `Long.MIN_VALUE` and `Long.MAX_VALUE`

8. Write a Java program that prints the results following expressions:

```
short a = Short.MAX_VALUE;  
a += 10;
```

```
int b = Integer.MIN_VALUE;  
b = b - 25;
```

Explain what is happening in each outcome.

9. A variable is named `pi` and has a value of 3.14159. What happens in each of the following:

- `System.out.println(pi);`
- `System.out.println(pi + 1);`
- `System.out.println(8 / (int) pi);`
- `System.out.println(8 / pi);`
- `System.out.println((int) (8/pi));`

Explain what is happening.

10. Write a Java program to calculate the square root of an integer from the command line.

11. In the Java program you wrote in 10, calculate the square of the square root you obtained. Why does it not equal the original value?

For example:

```
double a = Math.sqrt(2);  
System.out.println(a * a);
```

12. Write a Java program that takes two positive integers as command line arguments and prints `true` if either evenly divides the other.

13. A physics student gets unexpected results when using the code:

```
F = G * mass1 * mass2 / r * r;
```

to compute values according to the formula $F = Gm_1m_2/r^2$. Explain the problem and correct the code.

14. Write a Java program that takes two `int` values `a` and `b` as command line arguments and prints a random integer between `a` and `b`.