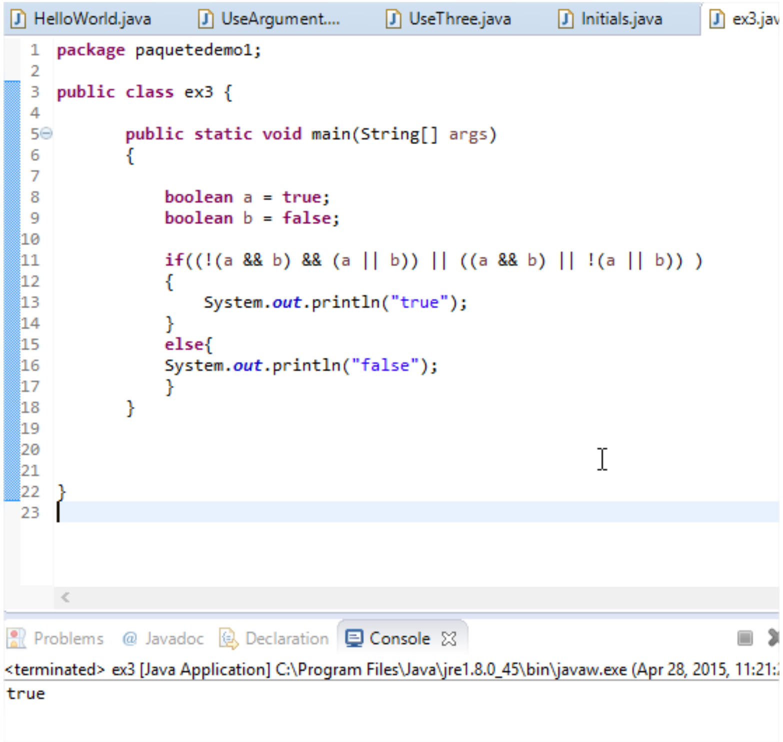
Activity 1 - section 2

Exercises: 3,4,6,7,9,10,11 and 20; Creative exercises: 29

Ex 3: Suppose that `a` and `b` are `boolean` values. Show that the expression `(!(a && b) && (a || b)) || ((a && b) || !(a || b))` is equivalent to `true`.



```
package paquetedemo1;

public class ex3 {

	public static void main(String[] args)
	{

		boolean a = true;
		boolean b = false;

		if((!(a && b) && (a || b)) || ((a && b) || !(a || b)) )
		{
			System.out.println("true");
		}
		else{
		System.out.println("false");
		}
	}



}
```

```
<terminated> ex3 [Java Application] C:\Program Files\Java\jre1.8.0_45\bin\javaw.exe (Apr 28, 2015, 11:21:
true
```

Ex4: Suppose that `a` and `b` are `int` values. Simplify the following expression:

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

*Solution:* `(a == b)`

1. Ex6: Why does `10/3` give `3` and not `3.33333333`?

   *Solution.* Since both 10 and 3 are integer literals, Java sees no need for type conversion and uses integer division. You should write `10.0/3.0` if you mean the numbers to be `double` literals. If you write `10/3.0` or `10.0/3`, Java does implicit conversion to get the same result.

1. Ex7: What do each of the following print?
    a. `System.out.println(2 + "bc");` prints: 2bc
    b. `System.out.println(2 + 3 + "bc");` prints: 5bc
    c. `System.out.println((2+3) + "bc");` prints: 5bc
    d. `System.out.println("bc" + (2+3));` prints: bc5
    e. `System.out.println("bc" + 2 + 3);` prints: bc23

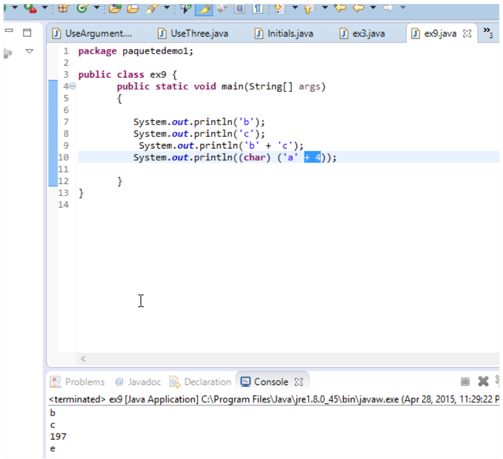
    Explain each outcome.

The '+' operator concat strings when this appear into the operation, but if the value is numeric, this are added

Ex9: 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));`

Explain each outcome.



```
package paquetedemo1;

public class ex9 {
	public static void main(String[] args)
	{

	   System.out.println('b');
	   System.out.println('c');
	    System.out.println('b' + 'c');
	   System.out.println((char) ('a' + 4));

	}
}
```

```
<terminated> ex9 [Java Application] C:\Program Files\Java\jre1.8.0_45\bin\javaw.exe (Apr 28, 2015, 11:29:22 P
b
c
197
e
```

print the correspondig alphabethic letter on operation.

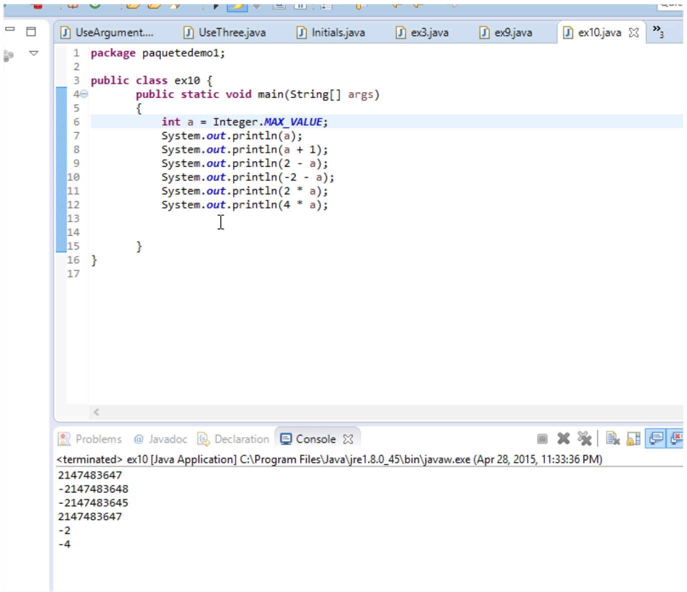
Ex10

1. Suppose that a variable `a` is declared as `int a = 2147483647` (or equivalently, `Integer.MAX_VALUE`). What do each of the following print?
    a. `System.out.println(a);`
    b. `System.out.println(a + 1);`

c. `System.out.println(2 - a);`
d. `System.out.println(-2 - a);`
e. `System.out.println(2 * a);`
f. `System.out.println(4 * a);`

Explain each outcome.

Exceed the max value per operation and is assigned the next value on negative.



```
package paquetedemo1;

public class ex10 {
	public static void main(String[] args)
	{
		int a = Integer.MAX_VALUE;
		System.out.println(a);
		System.out.println(a + 1);
		System.out.println(2 - a);
		System.out.println(-2 - a);
		System.out.println(2 * a);
		System.out.println(4 * a);


	}
}
```

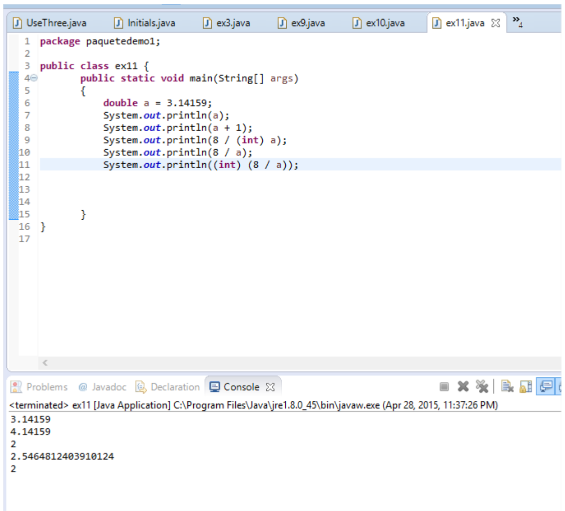
```
<terminated> ex10 [Java Application] C:\Program Files\Java\jre1.8.0_45\bin\javaw.exe (Apr 28, 2015, 11:33:36 PM)
2147483647
-2147483648
-2147483645
2147483647
-2
-4
```

1. Ex11 Suppose that a variable `a` is declared as `double a = 3.14159`. What do each of the following print?

a. `System.out.println(a);`
b. `System.out.println(a + 1);`
c. `System.out.println(8 / (int) a);`
d. `System.out.println(8 / a);`
e. `System.out.println((int) (8 / a));`

Explain each outcome.

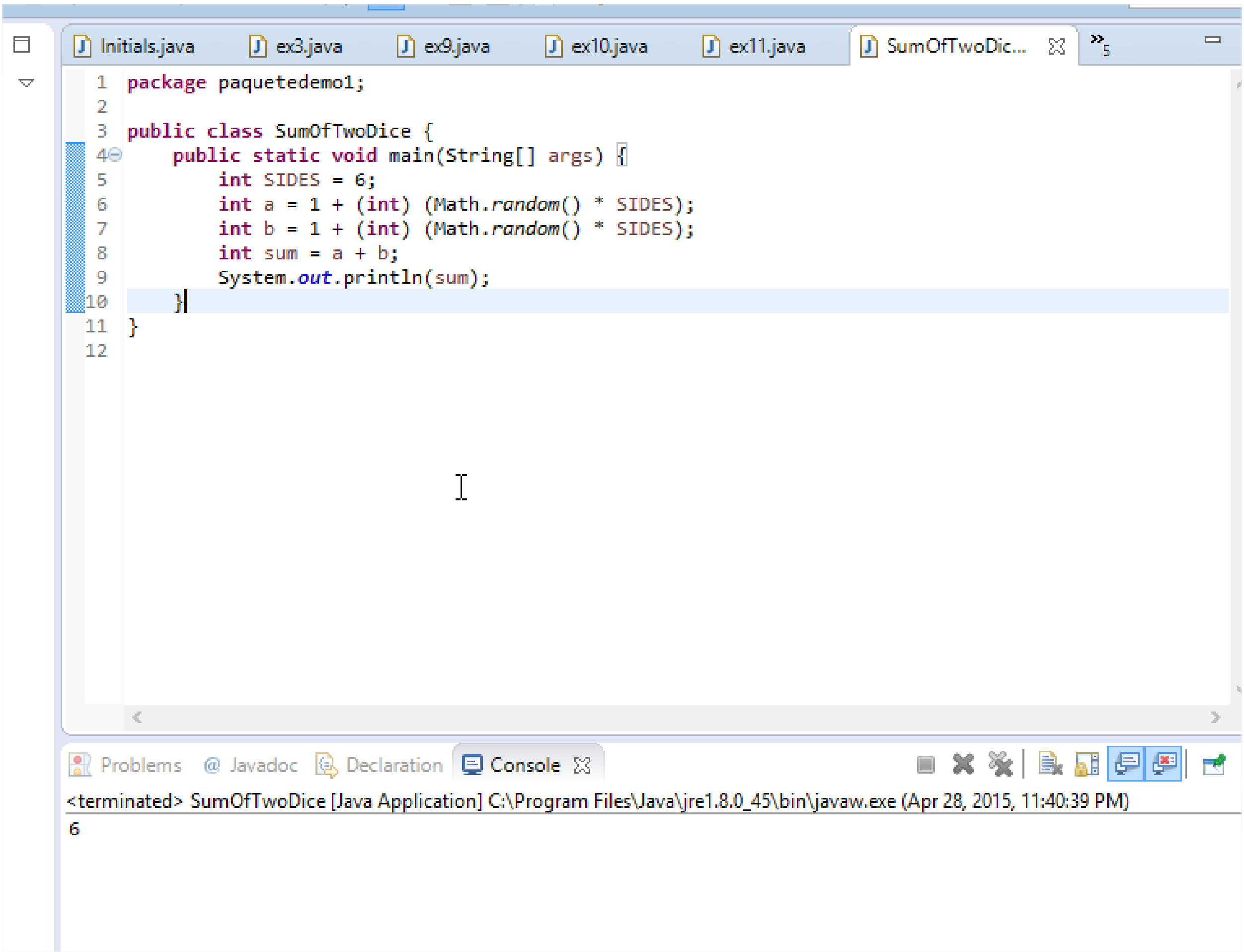
The value is parsed to int when the result appear without decimals, when no, the integer is applied with decimals.



```java
package paquetedemo1;

public class ex11 {
	public static void main(String[] args)
	{
		double a = 3.14159;
		System.out.println(a);
		System.out.println(a + 1);
		System.out.println(8 / (int) a);
		System.out.println(8 / a);
		System.out.println((int) (8 / a));



	}
}
```

```
<terminated> ex11 [Java Application] C:\Program Files\Java\jre1.8.0_45\bin\javaw.exe (Apr 28, 2015, 11:37:26 PM)
3.14159
4.14159
2
2.5464812403910124
2
```

Ex 20: Write a program SumOfTwoDice.java that prints the sum of two random integers between 1 and 6 (such as you might get when rolling dice).



```java
package paquetedemo1;

public class SumOfTwoDice {
    public static void main(String[] args) {
        int SIDES = 6;
        int a = 1 + (int) (Math.random() * SIDES);
        int b = 1 + (int) (Math.random() * SIDES);
        int sum = a + b;
        System.out.println(sum);
    }
}
```

```
<terminated> SumOfTwoDice [Java Application] C:\Program Files\Java\jre1.8.0_45\bin\javaw.exe (Apr 28, 2015, 11:40:39 PM)
6
```

1. Ex29: **Barycenter.** In a two-body system, the barycenter is the center of gravity about which the two celestial bodies orbit each other. Given the masses $m_1$ and $m_2$ of two bodies, and the shortest distance $a$ between the two bodies, write a program to compute the distance from the center of the first (more massive) body to the barycenter: $r_1 = a\ m_2 / (m_1 + m_2)$.

   Here are a few examples. Masses are in earth-mass units, distances are in kilometers.

   Earth-moon: $m_1$ = 1, $m_2$ = .0123, $a$ = 384,000, $r_1$ = 4,670, $R_1$ = 6,380.

   Pluto-Charon: $m_1$ = .0021, $m_2$ = .000254, $a$ = 19,600, $r_1$ = 2,110, $R_1$ = 1,150.

   Sun-Earth: $m_1$ = 333,000, $m_2$ = 1, $a$ = 150,000,000, $r_1$ = 449, $R_1$ = 696,000.

   Note that if $r_1$ is less than the radius of the first body $R_1$, then the barycenter lies within the first body.