3. By studying the code below and testing it on your machine, the output is false then true. Why is the code printing false in the first case then later on prints true?(3 marks)

```
public class Test
{
        public static void main(String[] args)
        {
                Integer a = 1000, b = 1000;
                System.out.println(a == b);
                Integer c = 100, d = 100;
                System.out.println(c == d);
        }
}
```

ANSWER:
When you compile a number literal in Java and assign it to a Integer, the compiler emits:

Integer a =Integer.valueOf(1000)

valueOf is implemented such that it returns the same
instance for values smaller than 128 hence the "true" for the second instance,
and false for the first instance because a 1000 is greater than 128

Values of -128 to 127 inclusive will always return true.

We could use .equals if we want to check if the two objects are "equal", or
use “==” when we want to see if they point to the same instance.
Values greater than 128 do not point to the same instance hence the "false" output.