Section 1.2

Exercises

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

a and b are equal to false

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

```
(!(false) && (false)) || ((false) || !(false))
```

```
(true&& (false)) || ((false) || true)
```

(false) `||(true)`

(true)

Suppose that `a` and `b` are `int` values. Simplify the following expression: `(!(a < b) && !(a > b))`

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

```
(!(1 < 2) && !(1 > 2))
```

```
(!(true) && !(false))
```

Solution: `(a == b)`

2. The *exclusive or* operator `^` for `boolean` operands is defined to be `true` if they are different, `false` if they are the same. Give a truthtableforthisfunction.

3. 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.

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4. What do each of the following print?

a. `System.out.println(2 + "bc");` prints: 2bc

Concats the value of the number “2” as a string with “bc”

b. `System.out.println(2 + 3 + "bc");` prints: 5bc

Sums the two digits 2+3 because they are numbers to then concatenates this result as a string with the value “bc”

c. `System.out.println((2+3) + "bc");` prints: 5bc

Sums the two digits 2+3 because they are numbers to then concatenates this result as a string with the value “bc”

d. `System.out.println("bc" + (2+3));` prints: bc5

Concatenate each of the values as a string value with the sum of (2+3)

e. `System.out.println("bc" + 2 + 3);` prints: bc23

Concatenate each of the values as one string value

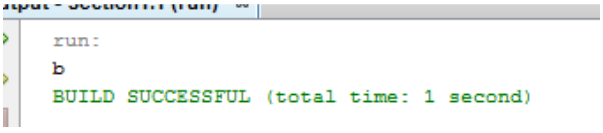
Explain each outcome.

5. Explain how to use Quadratic.java to find the square root of a number.

Answer: to find the square root of c, find the roots of x^2 + 0x - c.

6. What do each of the following print?

a. `System.out.println('b');`



Print “b” as a string

b. `System.out.println('b' + 'c');`

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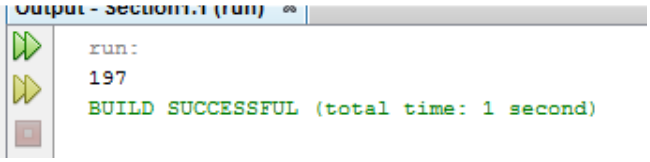
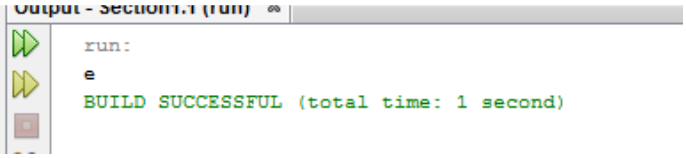


It sums the values of their corresponding Unicode values, b=98 and c=99, so the total is 197

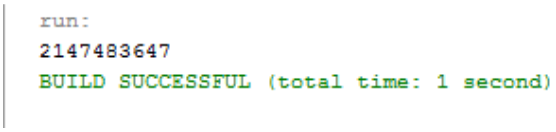
c. `System.out.println((char) ('a' + 4));`



Explaineachoutcome.

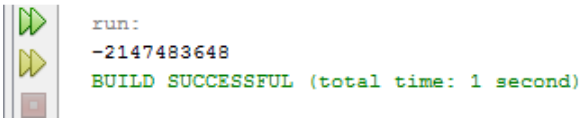
7. Suppose that a variable `a` is declared as `int a = 2147483647` (or equivalently, `Integer.MAX_VALUE`). What do each of thefollowingprint?

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



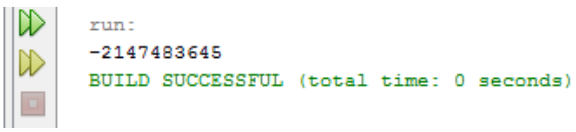
Prints the value of “a” as it is

b. `System.out.println(a + 1);`



Sums 1 to the value of a

c. `System.out.println(2 - a);`



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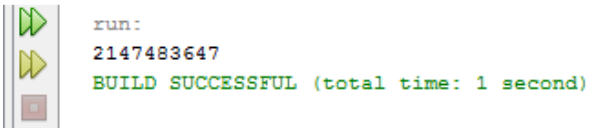
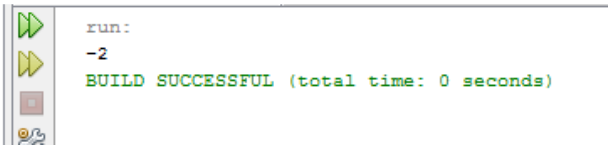
Subtract 2 numbers to the value of a

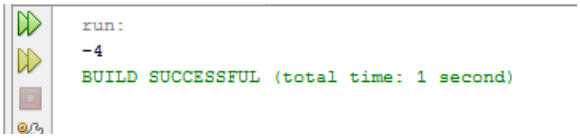
d. `System.out.println(-2 - a);`



e. `System.out.println(2 * a);`



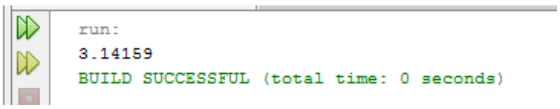
f. `System.out.println(4 * a);`



Explaineachoutcome.

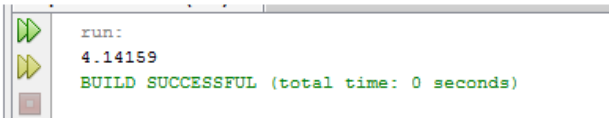
8. Suppose that a variable `a` is declared as `double a = 3.14159`. What do each of the following print?

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



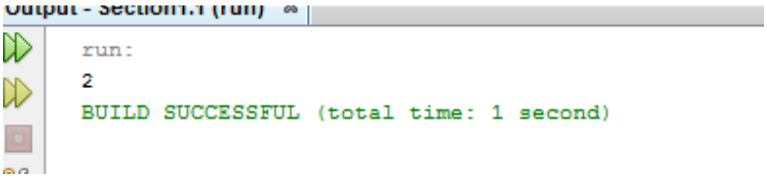
Prints the current value of a

b. `System.out.println(a + 1);`



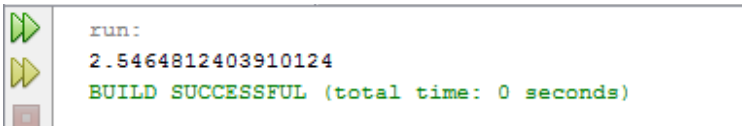
Sum a whole integer number to the value of a

c. `System.out.println(8 / (int) a);`



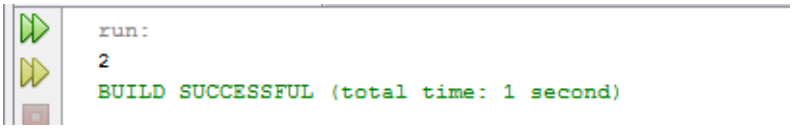
Make a divition to a none decimal number

d. `System.out.println(8 / a);`



Divide thenumberincludingdecimals

e. `System.out.println((int) (8 / a));`



Divide the number AS whole numbers

Explaineachoutcome.

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).

Creative Exercises

29. Day of the week. Write a program DayOfWeek.java that takes a date as input and prints the day of the week that date falls on. Your program should take three command-line arguments: `m` (month), `d` (day), and `y` (year). For `m` use 1 for January, 2 for February, and so forth. For output print 0 for Sunday, 1 for Monday, 2 for Tuesday, and so forth. Use thefollowing formulas, fortheGregorian calendar: