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.

**boolean** a = **true**;

**boolean** b = **true**;

**boolean** a = **true**;

**boolean** b = **false**;

**boolean** a = **false**;

**boolean** b = **true**;

**boolean** a = **false**;

**boolean** b = **false**;

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

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

1. 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. What do each of the following print?
   1. System.out.println(2 + "bc"); prints: 2bc
   2. System.out.println(2 + 3 + "bc"); prints: 5bc
   3. System.out.println((2+3) + "bc"); prints: 5bc
   4. System.out.println("bc" + (2+3)); prints: bc5
   5. System.out.println("bc" + 2 + 3); prints: bc23
2. What do each of the following print?
   1. System.out.println('b');

**b print directly character b**

* 1. System.out.println('b' + 'c');

**197 prints the sum of integers values of letter b and c (98+99=197)**

* 1. System.out.println((char) ('a' + 4));

**e int value of letter ‘a’ adding 4 (97+4=101) and prints the char cast of this value (char (101))**

Explain each outcome.

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

**2147483647 prints original value**

* 1. System.out.println(a + 1);

**-2147483648 Java uses two's complement to represent the various forms of integers and cause Integer overflows in this case**

* 1. System.out.println(2 - a);

**-2147483645 Java uses two's complement to represent the various forms of integers and cause Integer overflows in this case**

* 1. System.out.println(-2 - a);

**2147483647 Java uses two's complement to represent the various forms of integers and cause Integer overflows in this case**

* 1. System.out.println(2 \* a);

**-2 Java uses two's complement to represent the various forms of integers and cause Integer overflows in this case**

* 1. System.out.println(4 \* a);

**-4 Java uses two's complement to represent the various forms of integers and cause Integer overflows in this case**

Explain each outcome.

1. Suppose that a variable a is declared as double a = 3.14159. What do each of the following print?
   1. System.out.println(a);

**3.14159 prints the original result**

* 1. System.out.println(a + 1);

**4.14159 prints the original result (adding 1 integer value)**

* 1. System.out.println(8 / (int) a);

**2 prints the result of 8/2 = 4**

* 1. System.out.println(8 / a);

**2.5464812403910124 prints the original result**

* 1. System.out.println((int) (8 / a));

**2 prints the result of 2.5464812403910124 on int value**

Explain each outcome.

20. Write a program [SumOfTwoDice.java](http://introcs.cs.princeton.edu/java/12types/SumOfTwoDice.java.html) that prints the sum of two random integers between 1 and 6 (such as you might get when rolling dice).

1. **Day of the week.** Write a program [DayOfWeek.java](http://introcs.cs.princeton.edu/java/12types/DayOfWeek.java.html) 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 the following [formulas, for the Gregorian calendar](http://www.tondering.dk/claus/cal/node3.html#SECTION00350000000000000000):

|  |
| --- |
| y0 = y - (14 - m) / 12  x = y0 + y0/4 - y0/100 + y0/400  m0 = m + 12 \* ((14 - m) / 12) - 2  d0 = (d + x + (31\*m0)/ 12) mod 7 |

For example, on what day of the week was August 2, 1953?

|  |
| --- |
| y = 1953 - 0 = 1953  x = 1953 + 1953/4 - 1953/100 + 1953/400 = 2426  m = 8 + 12\*0 - 2 = 6  d = (2 + 2426 + (31\*6) / 12) mod 7 = 2443 mod 7 = 0 (Sunday) |

**public** **class** DayOfWeek {

**public** **static** **void** main(String[] args) {

**int** m = Integer.*parseInt*(args[0]);

**int** d = Integer.*parseInt*(args[1]);

**int** y = Integer.*parseInt*(args[2]);

**int** y0 = y - (14 - m) / 12;

**int** x = y0 + y0/4 - y0/100 + y0/400;

**int** m0 = m + 12 \* ((14 - m) / 12) - 2;

**int** d0 = (d + x + (31\*m0)/12) % 7;

String[] strDays = **new** String[] { "Sunday", "Monday", "Tuesday", "Wednesday", "Thusday", "Friday", "Saturday" };

java.util.Calendar c = Calendar.*getInstance*();

c.set(Calendar.***MONTH***, m-1);

c.set(Calendar.***DAY\_OF\_MONTH***, d);

c.set(Calendar.***YEAR***, y);

System.***out***.println(d0);

System.***out***.println(strDays[d0]);

System.***out***.println(c.getTime());

}

}