Source File: `~/2336/14/lab14.(C|CPP|cpp|c++|cc|cxx|cp)`
Input: under control of `main` function
Output: under control of `main` function
Value: 1

Write a recursive function that prints the binary representation of a signed, nonzero integer. A sample `main` function for testing your function is shown in Figure 1 and commands for compiling, linking, and running this assignment are shown in Figure 2. To use the `Makefile` as distributed in class, add a target of `lab14` to `targets2srcfiles`.

```
1  #include <iostream>
2  #include <cstdlib>
3  #include <iomanip>
4
5  using namespace std;
6
7  // printBinary is a recursive function that writes the binary
8  // representation of num to output stream os
9  void printBinary(int num, ostream& os);
10
11 int main()
12 {
13   int num;
14
15   while (cin >> num)
16   {
17     cout << right << setw(11) << num << " base 10 = ";
18     if (num != 0)
19       printBinary(num, cout);
20     else
21       cout << 0;
22     cout << " base 2" << endl;
23   }
24
25   return EXIT_SUCCESS;
26 }
```

Figure 1. `/usr/local/2336/src/lab14main.C`

```
newuser@csunix ~> cd 2336
newuser@csunix ~/2336> ./getlab.ksh 14
  * Checking to see if a folder exists for Lab 14. . .No
  * Creating a folder for Lab 14
  * Checking to see if Lab 14 has sample input and output files. . .Yes
  * Copying input and output files for Lab 14
    from folder /usr/local/2336/data/14 to folder ./14
  * Checking to see if /usr/local/2336/src/lab14main.C exists. . .Yes
  * Copying file /usr/local/2336/src/lab14main.C to folder ./14
  * Checking to see if /usr/local/2336/include/lab14.h exists. . .No
  * Copying file /usr/local/2336/src/Makefile to folder ./14
  * Adding a target of lab14 to targets2srcfiles
  * Touching file ./14/lab14.cpp
  * Edit file ./14/lab14.cpp in Notepad++
newuser@csunix ~/2336> cd 14
newuser@csunix ~/2336/14> ls
01.dat       01.out       Makefile     lab14.cpp    lab14main.C
newuser@csunix ~/2336/14> make lab14
g++ -g -Wall -std=c++11 -c lab14main.C -I/usr/local/2336/include -I.
g++ -g -Wall -std=c++11 -c lab14.cpp -I/usr/local/2336/include -I.
g++ -o lab14 lab14main.o lab14.o -L/usr/local/2336/lib -lm -lbits
newuser@csunix ~/2336/14> cat 01.dat
0 1 2 3341 2147483647
-1 -2 -3341 -2147483647
-2147483648
newuser@csunix ~/2336/14> cat 01.dat | ./lab14
          0 base 10 = 0 base 2
          1 base 10 = 1 base 2
          2 base 10 = 10 base 2
       3341 base 10 = 110100001101 base 2
 2147483647 base 10 = 1111111111111111111111111111111 base 2
         -1 base 10 = 11111111111111111111111111111111 base 2
         -2 base 10 = 11111111111111111111111111111110 base 2
      -3341 base 10 = 11111111111111111111001011110011 base 2
-2147483647 base 10 = 10000000000000000000000000000001 base 2
-2147483648 base 10 = 10000000000000000000000000000000 base 2
newuser@csunix ~/2336/14> cat 01.dat | ./lab14 > my.out
newuser@csunix ~/2336/14> diff 01.out my.out
newuser@csunix ~/2336/14>
```

Figure 2. Commands to Compile, Link, & Run Lab 14