Source File: ~/1337/21/lab21.(C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of `main` function
Output: Under control of `main` function
Value: 1

Write a function whose prototype is

```
void printBinary(int n, ostream& os);
```

The function writes the binary representation of the integer `n` to output stream `os`. The function must use bit operations.

A sample `main` function for testing your function is shown in Figure 1 and a sample execution sequence is shown in Figure 2. To use the `Makefile` as distributed in class, add a target of `lab21` to `targets2srcfiles`.

```
1   #include <iostream>
2   #include <iomanip>
3   #include <cstdlib>
4
5   using namespace std;
6
7   // printBinary writes the binary representation of the integer n to
8   // output stream os
9   void printBinary(int n, 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      printBinary(num, cout);
19      cout << " base 2" << endl;
20    }
21
22    return EXIT_SUCCESS;
23  }
```

Figure 1. `/usr/local/1337/src/lab21main.C`

```
 1  newuser@csunix ~> cd 1337
 2  newuser@csunix ~/1337> mkdir 21
 3  newuser@csunix ~/1337> cd 21
 4  newuser@csunix ~/1337/21> cp /usr/local/1337/data/21/* .
 5  newuser@csunix ~/1337/21> cp /usr/local/1337/src/lab21main.C .
 6  newuser@csunix ~/1337/21> cp /usr/local/1337/src/Makefile .
 7  newuser@csunix ~/1337/21> touch lab21.cpp
 8  newuser@csunix ~/1337/21> # Edit Makefile and lab21.cpp
 9  newuser@csunix ~/1337/21> make lab21
10  g++ -g -Wall -std=c++11 -c lab21main.C -I/usr/local/1337/include -I.
11  g++ -g -Wall -std=c++11 -c lab21.cpp -I/usr/local/1337/include -I.
12  g++ -o lab21 lab21main.o lab21.o -L/usr/local/1337/lib -lm -lbits
13  newuser@csunix ~/1337/21> cat 01.dat
14  0
15  1
16  -1
17  2
18  -2
19  1362
20  -1362
21  2147483647
22  -2147483647
23  -2147483648
24  newuser@csunix ~/1337/21> cat 01.dat | ./lab21
25           0 base 10 = 00000000000000000000000000000000 base 2
26           1 base 10 = 00000000000000000000000000000001 base 2
27          -1 base 10 = 11111111111111111111111111111111 base 2
28           2 base 10 = 00000000000000000000000000000010 base 2
29          -2 base 10 = 11111111111111111111111111111110 base 2
30        1362 base 10 = 00000000000000000000010101010010 base 2
31       -1362 base 10 = 11111111111111111111101010101110 base 2
32  2147483647 base 10 = 01111111111111111111111111111111 base 2
33 -2147483647 base 10 = 10000000000000000000000000000001 base 2
34 -2147483648 base 10 = 10000000000000000000000000000000 base 2
35  newuser@csunix ~/1337/21> cat 01.dat | ./lab21 > my.out
36  newuser@csunix ~/1337/21> diff 01.out my.out
37  newuser@csunix ~/1337/21>
```

Figure 2. Commands to Compile, Link, & Run Lab 21