

Source File: ~/1337/27/lab27.(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 given by

```
unsigned int invBit(unsigned int word, int n);
```

The function returns the value of `word` with bit `n` inverted.

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 `lab27` to `targets2srcfiles`.

```
1 #include <iostream>
2 #include <cstdlib>
3 #include <iomanip>
4 #include <bitset>
5 #include <climits>
6
7 using namespace std;
8
9 // invBit: returns value of word with bit n inverted
10 unsigned int invBit(unsigned int word, int n);
11
12 // printLine: prints a horizontal line of length hyphens to output stream os
13 void printLine(int length, ostream& os);
14
15 // printTableHeader: prints table header to output stream os
16 void printTableHeader(ostream& os);
17
18 extern const int N = sizeof(int) * CHAR_BIT; // # of bits in an int
19
20 int main()
21 {
22     int num;
23     unsigned int i;
24
25     while (cin >> num)
26     {
27         cout << "      " << setw(11) << num << " base 10 = "
28              << bitset<N>(num) << " base 2" << endl;
29         printTableHeader(cout);
30         for (i = 0; i <= sizeof(int) * CHAR_BIT - 1; ++i)
31         {
32             num = invBit(num, i);
33             cout << setw(8) << i << setw(8) << "|" << setw(14) << num
34                  << setw(4) << "|" << "      " << bitset<N>(num) << endl;
35         }
36         printLine(72, cout);
37     }
38 }
```

Figure 1. /usr/local/1337/src/lab27main.C (Part 1 of 2)

```
39     return EXIT_SUCCESS;
40 }
41
42 void printLine(int length, ostream& os)
43 {
44     char ch = os.fill();
45     os << setfill('-') << setw(length) << "-" << setfill(ch) << endl;
46 }
47
48 void printTableHeader(ostream& os)
49 {
50     printLine(72, os);
51     os << setw(10) << "After" << "      |" << setw(19) << "num" << endl;
52     os << setw(12) << "Inverting" << "  |";
53     printLine(56, os);
54     os << setw(9) << "Bit" << "      |" << setw(12) << "Base 10";
55     os << "      |" << setw(23) << "Base 2" << endl;
56     printLine(72, os);
57 }
```

Figure 1. /usr/local/1337/src/lab27main.C (Part 2 of 2)

```
1  newuser@csunix ~> cd 1337
2  newuser@csunix ~/1337> mkdir 27
3  newuser@csunix ~/1337> cd 27
4  newuser@csunix ~/1337/27> cp /usr/local/1337/data/27/* .
5  newuser@csunix ~/1337/27> cp /usr/local/1337/src/lab27main.C .
6  newuser@csunix ~/1337/27> cp /usr/local/1337/src/Makefile .
7  newuser@csunix ~/1337/27> touch lab27.cpp
8  newuser@csunix ~/1337/27> # Edit Makefile and lab27.cpp
9  newuser@csunix ~/1337/27> make lab27
10 g++ -g -Wall -std=c++11 -c lab27main.C -I/usr/local/1337/include -I.
11 g++ -g -Wall -std=c++11 -c lab27.cpp -I/usr/local/1337/include -I.
12 g++ -o lab27 lab27main.o lab27.o -L/usr/local/1337/lib -lm -lbits
13 newuser@csunix ~/1337/27> cat 01.dat
14 -1 0
```

Figure 2. Commands to Compile, Link, & Run Lab 27 (Part 1 of 3)

