Source File: `~/1337/17/lab17.(C|CPP|cpp|c++|cc|cxx|cp)`
Input: None
Output: Under control of `main` function
Value: 2

Write a program to compute all five-digit integers n such that all decimal digits appear in the decimal notations of n and $2n$, each digit appearing exactly once. For example,

n	$2n$
09327	18654
20679	41358
48651	97302

The functions to be included in your source program are shown in Figure 1. Commands to compile, link, and run this assignment are shown in Figure 2.

```
1  #include <iostream>
2  #include <iomanip>
3
4  using namespace std;
5
6  // Function initializeDigits initializes each of the elements in the
7  // n-element boolean array digits to value
8  void initializeDigits(bool digits[], int n, bool value);
9
10 // Function determineDigits receives as arguments an n-element boolean
11 // array digits and a five digit number abcde.  The function sets
12 // digits[i], 0 <= i <= 9, to true if i occurs in the decimal
13 // representation of abcde.
14 void determineDigits(bool digits[], int n, int abcde);
15
16 // Function checkDigits returns true if each of the elements in the
17 // n-element boolean array digits is true and false otherwise
18 bool checkDigits(const bool digits[], int n);
19
20 // Function printLine writes n hyphens to output stream out
21 void printLine(ostream& out, int n);
22
23 int main()
24 {
25   int n;
26   bool digits[10];
27
28   printLine(cout, 13);
29   cout << "  n      2n  " << endl;
30   printLine(cout, 13);
31
```

Figure 1. `/usr/local/1337/src/lab17main.C` (Part 1 of 2)

```
32    for (n = 1234; n <= 49876; ++n)
33    {
34      initializeDigits(digits, 10, false);
35      determineDigits(digits, 10, n);
36      determineDigits(digits, 10, 2 * n);
37      if (checkDigits(digits, 10))
38        cout << setfill('0') << setw(5) << n << "   "
39             << setw(5) << 2 * n << setfill(' ') << endl;
40    }
41
42    printLine(cout, 13);
43
44    return 0;
45  }
46
47  void printLine(ostream& out, int n)
48  {
49    char ch = out.fill();
50    out << setfill('-') << setw(n) << "-" << setfill(ch) << endl;
51    return;
52  }
```

Figure 1. `/usr/local/1337/src/lab17main.C` (Part 2 of 2)

```
newuser@csunix ~> cd 1337
newuser@csunix ~/1337> mkdir 17
newuser@csunix ~/1337> cd 17
newuser@csunix ~/1337/17> cp /usr/local/1337/data/17/* .
newuser@csunix ~/1337/17> cp /usr/local/1337/src/lab17main.C .
newuser@csunix ~/1337/17> touch lab17.cpp
newuser@csunix ~/1337/17> # Edit lab17.cpp
newuser@csunix ~/1337/17> g++ -g -Wall -std=c++11 -c lab17main.C
newuser@csunix ~/1337/17> g++ -g -Wall -std=c++11 -c lab17.cpp
newuser@csunix ~/1337/17> g++ -o lab17 lab17main.o lab17.o
```

```
newuser@csunix ~/1337/17> ./lab17
-------------
  n       2n
-------------
06729   13458
06792   13584
06927   13854
07269   14538
07293   14586
07329   14658
07692   15384
07923   15846
07932   15864
09267   18534
09273   18546
09327   18654
13485   26970
13548   27096
13845   27690
14538   29076
14685   29370
14835   29670
14853   29706
14865   29730
15486   30972
16485   32970
18546   37092
18645   37290
20679   41358
20769   41538
20793   41586
23079   46158
26709   53418
26907   53814
27069   54138
27093   54186
27309   54618
29067   58134
29073   58146
29307   58614
30729   61458
30792   61584
30927   61854
31485   62970
32079   64158
32709   65418
32907   65814
34851   69702
35148   70296
35481   70962
38145   76290
38451   76902
45138   90276
45186   90372
45381   90762
46185   92370
46851   93702
48135   96270
48351   96702
48513   97026
48516   97032
48531   97062
48615   97230
48651   97302
-------------
newuser@csunix ~/1337/17> ./lab17 > my.out
newuser@csunix ~/1337/17> diff 01.out my.out
newuser@csunix ~/1337/17>
```

Figure 2. Commands to Compile, Link, & Run Lab 17