

Source File: ~/2336/19/lab19.(C|CPP|cpp|c++|cc|cxx|cp)
Input: under control of main function
Output: under control of main function
Value: 1

Write a recursive boolean function that determines if a string is a palindrome. A palindrome is a word, verse, or sentence that is the same when read backward or forward. A sample `main` function for testing your function is shown in Figure 1. Commands to compile, link, and run this assignment are shown in Figure 2. Your function should perform comparisons in a case-insensitive manner. To use the `Makefile` as distributed in class, add a target of `lab19` to `targets2srcfiles`.

```
1 #include <iostream>
2 #include <cstdlib>
3 #include <cctype>
4 #include <string>
5
6 using namespace std;
7
8 // isPalindrome is a recursive function that returns true if string s
9 // is a palindrome and false otherwise
10 bool isPalindrome(string s);
11
12 // rmPuncSpaces returns string s with all punctuation and whitespace
13 // characters removed
14 string rmPuncSpaces(string s);
15
16 int main()
17 {
18     string str;
19
20     while (getline(cin, str))
21     {
22         cout << str;
23         str = rmPuncSpaces(str);
24         cout << " is ";
25         if (!isPalindrome(str))
26             cout << "not ";
27         cout << "a palindrome" << endl;
28     }
29
30     return EXIT_SUCCESS;
31 }
32
```

Figure 1. /usr/local/2336/src/lab19main.C (Part 1 of 2)

```
33 string rmPuncSpaces(string str)
34 {
35     // base case for stopping recursion
36     if (str.length() == 0)
37         return str;
38
39     // general case; if the first character of str is either whitespace
40     // or punctuation, recurse with the first character (index 0) from
41     // str removed
42     else if (isspace(*(str.begin())) || ispunct(*(str.begin())))
43         return rmPuncSpaces(str.substr(1));
44
45     // general case continued; if the first character of str is neither
46     // whitespace nor punctuation, return the concatenation of the first
47     // character and the value from recursing with the first character
48     // (index 0) from str removed
49     else
50         return *(str.begin()) + rmPuncSpaces(str.substr(1));
51 }
```

Figure 1. /usr/local/2336/src/lab19main.C (Part 2 of 2)

```
1 newuser@csunix ~> cd 2336
2 newuser@csunix ~/2336> ./getlab.ksh 19
3 * Checking to see if a folder exists for Lab 19. . .No
4 * Creating a folder for Lab 19
5 * Checking to see if Lab 19 has sample input and output files. . .Yes
6 * Copying input and output files for Lab 19
7   from folder /usr/local/2336/data/19 to folder ./19
8 * Checking to see if /usr/local/2336/src/lab19main.C exists. . .Yes
9 * Copying file /usr/local/2336/src/lab19main.C to folder ./19
10 * Checking to see if /usr/local/2336/include/lab19.h exists. . .No
11 * Copying file /usr/local/2336/src/Makefile to folder ./19
12 * Adding a target of lab19 to targets2srcfiles
13 * Touching file ./19/lab19.cpp
14 * Edit file ./19/lab19.cpp in Notepad++
15 newuser@csunix ~/2336> cd 19
16 newuser@csunix ~/2336/19> ls
17 01.dat      01.out      Makefile    lab19.cpp   lab19main.C
18 newuser@csunix ~/2336/19> make lab19
19 g++ -g -Wall -std=c++11 -c lab19main.C -I/usr/local/2336/include -I.
20 g++ -g -Wall -std=c++11 -c lab19.cpp -I/usr/local/2336/include -I.
21 g++ -o lab19 lab19main.o lab19.o -L/usr/local/2336/lib -lm -lbits
22 newuser@csunix ~/2336/19> cat 01.dat
23 1996
24 bottle
25 12345
26 radar
27 a Toyota
28 Madam, I'm Adam
29 Was it a rat I saw?
30 Norma is as selfless as I am, Ron.
31 A man, a plan, a canal--Panama!
32 Tarzan raised Desi Arnaz' rat.
33 newuser@csunix ~/2336/19> cat 01.dat | ./lab19
34 1996 is not a palindrome
35 bottle is not a palindrome
36 12345 is not a palindrome
37 radar is a palindrome
38 a Toyota is a palindrome
39 Madam, I'm Adam is a palindrome
40 Was it a rat I saw? is a palindrome
41 Norma is as selfless as I am, Ron. is a palindrome
42 A man, a plan, a canal--Panama! is a palindrome
43 Tarzan raised Desi Arnaz' rat. is a palindrome
44 newuser@csunix ~/2336/19> cat 01.dat | ./lab19 > my.out
45 newuser@csunix ~/2336/19> diff 01.out my.out
46 newuser@csunix ~/2336/19>
```

Figure 2. Commands to Compile, Link, & Run Lab 19