

Source File: ~/4301/02/lab02.(C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of main function
Output: Under control of main function
Value: 1

For $\Sigma = \{a, b\}$, construct a boolean C++ function that accepts a string of unknown length as its argument and determines if the string is a member of the set consisting of

$\{x \mid x \in \{a, b\}^* \text{ and that contain an odd number of occurrences of the substring } aa\}$

Note that *aaa* has two occurrences of *aa*. Valid strings include *aab*, *baa*, *aabbb*, *bbbaa*, *aabbbb*, *bbbbbbbaa*, *aa*, *baa*, *bbaaaabaaa*, and *bababaabababa*, but not ϵ , *babab*, *abbba*, *bbbabbabbb*, *a*, *b*, *ab*, *ba*, *bb*, *aaa*, *aba*, *bbb*, *abba*, *baba*, *babba*, *abbbb*, *bbabababa*, *babaaabaaa*, or *abaaaaaaaaaaa*.

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 `lab02` to `targets2srcfiles`.

```

1  #include <iostream>
2  #include <cstdlib>
3  #include <string>
4
5  using namespace std;
6
7  bool isValid(string);
8
9  int main()
10 {
11     string s;
12
13     while (getline(cin, s))
14         cout << s << " is " << (isValid(s) ? "valid" : "invalid") << endl;
15
16     return EXIT_SUCCESS;
17 }
```

Figure 1. /usr/local/4301/src/lab02main.C

```

1  newuser@csunix ~> mkdir 4301
2  newuser@csunix ~> cd 4301
3  newuser@csunix ~/4301> cp /usr/local/4301/src/getlab.ksh .
4  newuser@csunix ~/4301> ./getlab.ksh 02
5  * Checking to see if a folder exists for Lab 02. . .No
6  * Creating a folder for Lab 02
7  * Checking to see if Lab 02 has sample input and output files. . .Yes
8  * Copying input and output files for Lab 02
9  from folder /usr/local/4301/data/02 to folder ./02
10 * Checking to see if /usr/local/4301/src/lab02main.C exists. . .Yes
11 * Copying file /usr/local/4301/src/lab02main.C to folder ./02
12 * Checking to see if /usr/local/4301/include/lab02.h exists. . .No
13 * Copying file /usr/local/4301/src/Makefile to folder ./02
```

Figure 2. Commands to Compile, Link, & Run Lab 02 (Part 1 of 3)

```
14  * Adding a target of lab02 to targets2srcfiles
15  * Touching file ./02/lab02.cpp
16  * Edit file ./02/lab02.cpp in Notepad++
17  newuser@csunix ~/4301> cd 02
18  newuser@csunix ~/4301/02> ls
19  00.dat      00.out      Makefile    lab02.cpp   lab02main.C
20  newuser@csunix ~/4301/02> make lab02
21  g++ -g -Wall -std=c++11 -c lab02main.C -I/usr/local/4301/include -I.
22  g++ -g -Wall -std=c++11 -c lab02.cpp -I/usr/local/4301/include -I.
23  g++ -o lab02 lab02main.o lab02.o -L/usr/local/4301/lib -lm
24  newuser@csunix ~/4301/02> cat 00.dat
25  aab
26  aba
27  baa
28  babab
29  aabbb
30  bbbaa
31  abbba
32  aabbbbb
33  bbbbbbaa
34  bbbabbbabbb
35
36  a
37  b
38  aa
39  ab
40  ba
41  bb
42  aaa
43  baa
44  aba
45  bbb
46  abba
47  baba
48  babba
49  abbbba
50  bbabababa
51  bbaaaabaaa
52  babaaaabaaa
53  abaaaaaaaaaaa
54  bababaabababa
```

Figure 2. Commands to Compile, Link, & Run Lab 02 (Part 2 of 3)

```
55 newuser@csunix ~/4301/02> cat 00.dat | ./lab02
56 aab is valid
57 aba is invalid
58 baa is valid
59 babab is invalid
60 aabbb is valid
61 bbbbaa is valid
62 abbba is invalid
63 aabbbbb is valid
64 bbbbbbbbaa is valid
65 bbbabbbabbb is invalid
66   is invalid
67 a is invalid
68 b is invalid
69 aa is valid
70 ab is invalid
71 ba is invalid
72 bb is invalid
73 aaa is invalid
74 baa is valid
75 aba is invalid
76 bbb is invalid
77 abba is invalid
78 baba is invalid
79 babba is invalid
80 abbbba is invalid
81 bbabababa is invalid
82 bbaaaabaaa is valid
83 babaaabaaa is invalid
84 abaaaaaaaaaaaa is invalid
85 bababaabababa is valid
86 newuser@csunix ~/4301/02> cat 00.dat | ./lab02 > my.out
87 newuser@csunix ~/4301/02> diff 00.out my.out
88 newuser@csunix ~/4301/02>
```

Figure 2. Commands to Compile, Link, & Run Lab 02 (Part 2 of 2)