

Source File: ~/4301/03/lab03. (C|CPP|cpp|c++|cc|cxx|cp)
Input: Under control of main function
Output: Under control of main function
Value: 1

For $\Sigma = \{a, b, c\}$, construct a boolean C++ function to implement a finite state automata that will accept a string of unknown length as its argument and determine if the string is a member of the set consisting of

$$\left\{ \begin{array}{l} x | x \in \{a, b, c\}^+ \text{ and} \\ \text{the number of } a\text{'s plus the number of } b\text{'s plus twice the number of } c\text{'s is divisible by six.} \end{array} \right\}$$

Valid strings include aaaaaa, bbbbbb, ccc, babac, caabb, bcbaa, abcba, ccaa, cabc, cccccc, aacbccc, cccccccc, aaaaaaaaaabbbbbbbbbbb, and aaabbb but not ϵ , a, b, aa, ab, ba, bb, aaa, bbb, abba, abcb, or abbbbaa.

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 lab03 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/lab03main.C

```
1 newuser@csunix ~> cd 4301
2 newuser@csunix ~/4301> ./getlab.ksh 03
3 * Checking to see if a folder exists for Lab 03. . .No
4 * Creating a folder for Lab 03
5 * Checking to see if Lab 03 has sample input and output files. . .Yes
6 * Copying input and output files for Lab 03
7   from folder /usr/local/4301/data/03 to folder ./03
8 * Checking to see if /usr/local/4301/src/lab03main.C exists. . .Yes
9 * Copying file /usr/local/4301/src/lab03main.C to folder ./03
10 * Checking to see if /usr/local/4301/include/lab03.h exists. . .No
11 * Copying file /usr/local/4301/src/Makefile to folder ./03
12 * Adding a target of lab03 to targets2srcfiles
13 * Touching file ./03/lab03.cpp
14 * Edit file ./03/lab03.cpp in Notepad++
15 newuser@csunix ~/4301> cd 03
16 newuser@csunix ~/4301/03> ls
17 00.dat      00.out      Makefile     lab03.cpp    lab03main.C
18 newuser@csunix ~/4301/03> make lab03
19 g++ -g -Wall -std=c++11 -c lab03main.C -I/usr/local/4301/include -I.
20 g++ -g -Wall -std=c++11 -c lab03.cpp -I/usr/local/4301/include -I.
21 g++ -o lab03 lab03main.o lab03.o -L/usr/local/4301/lib -lm
22 newuser@csunix ~/4301/03> cat 00.dat
23 aaaaaa
24 bbbbbb
25 ccc
26 babac
27 caabb
28 bcbaa
29 abcba
30 ccaa
31 cabc
32 cccccc
33 aacbbccc
34 ccccccccc
35 aaaaaaaaaaabbmbbmbbmbbmbb
36 aaabbb
37
38 a
39 b
40 aa
41 ab
42 ba
43 bb
44 aaa
45 bbb
46 abba
47 abcb
48 abbbbaa
```

Figure 2. Commands to Compile, Link, & Run Lab 03 (Part 1 of 2)

```
49 newuser@csunix ~/4301/03> cat 00.dat | ./lab03
50 aaaaaa is valid
51 bbbbbb is valid
52 ccc is valid
53 babac is valid
54 caabb is valid
55 bcbaa is valid
56 abcba is valid
57 ccaa is valid
58 cabc is valid
59 cccccc is valid
60 aacbbccc is valid
61 cccccccc is valid
62 aaaaaaaaaaabbmbmbmbmbmb is valid
63 aaabbb is valid
64 is invalid
65 a is invalid
66 b is invalid
67 aa is invalid
68 ab is invalid
69 ba is invalid
70 bb is invalid
71 aaa is invalid
72 bbb is invalid
73 abba is invalid
74 abcb is invalid
75 abbbbaa is invalid
76 newuser@csunix ~/4301/03> cat 00.dat | ./lab03 > my.out
77 newuser@csunix ~/4301/03> diff 00.out my.out
78 newuser@csunix ~/4301/03>
```

Figure 2. Commands to Compile, Link, & Run Lab 03 (Part 2 of 2)