

**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  $\Sigma = \{a, b, c\}$ , 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

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

Valid strings include aaaaaa, bbbbbb, ccc, babac, caabb, bcbaa, abcba, ccaa, cabc, cccccc, aacbbccc, cccccccc, aaaaaaaaaabbbbbbbbbbb, and aaabbb but not  $\epsilon$ , 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 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  aaaaaa
26  bbbbbb
27  ccc
28  babac
29  caabb
30  bcbaa
31  abcba
32  ccaa
33  cabc
34  cccccc
35  aacbbccc
36  ccccccccc
37  aaaaaaaaaaabbmbmbmbmbmbmbmbmbmbmb
38  aaabbb
39
40  a
41  b
42  aa
43  ab
44  ba
45  bb
46  aaa
47  bbb
48  abba
49  abcb
50  abbbbaa
```

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

```
51 newuser@csunix ~/4301/02> cat 00.dat | ./lab02
52 aaaaaa is valid
53 bbbbbb is valid
54 ccc is valid
55 babac is valid
56 caabb is valid
57 bcbaa is valid
58 abcba is valid
59 ccaa is valid
60 cabc is valid
61 cccccc is valid
62 aacbbccc is valid
63 cccccccc is valid
64 aaaaaaaaaaabbmbmbmbmbmb is valid
65 aaabbb is valid
66 is invalid
67 a is invalid
68 b is invalid
69 aa is invalid
70 ab is invalid
71 ba is invalid
72 bb is invalid
73 aaa is invalid
74 bbb is invalid
75 abba is invalid
76 abcb is invalid
77 abbbbaa is invalid
78 newuser@csunix ~/4301/02> cat 00.dat | ./lab02 > my.out
79 newuser@csunix ~/4301/02> diff 00.out my.out
80 newuser@csunix ~/4301/02>
```

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