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## Lab #15: Advanced Selection in C++

### Instructions

Complete problems 1 – 3 individually. Then compare and discuss your answers with your partner. If there is a discrepancy then correct your answers. Complete problems 4 & 5 with your partner – screen sharing and you work on it. One person should type in Problem #4 and the other should type Problem #5 then share it with your partner.

- Given the following values for variables a, b and c:

Assume a, b, & c have been declared as variables of type **bool** and have been assigned the following values.

a = **TRUE**      b = **FALSE**      c = **TRUE**

Evaluate each of the following expressions -

First, rewrite the equation substituting a, b, & c for T or F as appropriate. Then evaluate each operator one at a time in the order C++ would.

a)  $a \&\& b \mid\mid a \&\& c:$

$$= T \& F \mid\mid T \& T$$

$$= F \mid\mid T$$

$$= T$$

→ FINAL ANSWER T

b)  $!(a \&\& c) \mid\mid b$

$$= !(T \& T) \mid\mid F$$

$$= !T \mid\mid F$$

$$= F \mid\mid F$$

→ FINAL ANSWER F

c)  $!b \mid\mid a \&\& b:$

$$= !(F) \mid\mid T \& F$$

$$= T \mid\mid F$$

$$= T$$

→ FINAL ANSWER T

2. Rewrite the following expressions so they would be valid in C++.

Assume that in1, in2, and in3 have been declared as variables of type **int**.

a) in1, in2 and in3 are all less than 10

in1 < 10 && in2 < 10 && in3 < 10

b) in1 > in2 >= in3

in1 > in2 && in2 >= in3

c) in1 does not equal either in2 or in3

in1 != in2 && in1 != in3

d) in1 equals in2 but does not equal in3

in1 == in2 && in1 != in3

3. Prove DeMorgan's Law #2, by filling in the truth table below.

$!(\text{ex1} \&\& \text{ex2})$  is equivalent to  $!\text{ex1} || !\text{ex2}$

ex1	ex2	ex1&& ex2	!(ex1 && ex2)	!ex1	!ex2	!ex1    !ex2
T	T	T	F	F	F	F
T	F	F	T	F	T	T
F	T	F	T	T	F	T
F	F	F	T	T	T	T

Documentation for problems #4 & 5 only need to include your author box, the class heading, and documentation indicating the problem # and LAB # (above int main).

4. Write a do while loop that validates an input `classCode`. The valid inputs are 'F', 'S', 'J', or 'R'. Use a boolean variable `invalid` to assign the invalid expression.

Type this into Eclipse and run test cases to demonstrate that it works properly (be sure to test all of the valid input values and some invalid input values).

Have it output the input and either " is an INVALID INPUT - Please try again!" or " is valid - thank you!".

(e.g. G is an INVALID INPUT - Please try again! OR  
F is valid - thank you!)

You will need the following declarations.

```
char classCode;
bool invalid;
```

screen

Saturday, April 17, 2021, 10:59 AM

```
1 ****
2 * PROGRAMMED BY : Andrew Gharios and Jiaqi Li
3 * CLASS          : CS1A
4 * SECTION        : MW 8:00a - 10:30a
5 * LAB #15        : Advanced selection in C++
6 * PROBLEM        : 4
7 ****
8
9 Please enter the letter: h
10 H is an invalid input - Please try again!
11 Please enter the letter: F
12 F is valid - Thank you!
13
14
15 Please enter the letter: j
16 J is valid - Thank you!
17
18
19 Please enter the letter: L
20 L is an invalid input - Please try again!
21 Please enter the letter: P
22 P is an invalid input - Please try again!
23 Please enter the letter: R
24 R is valid - Thank you!
```

```
1 ****
2 * AUTHOR      : Andrew Gharios and Jiaqi Li
3 * STUDENT ID : 1449366 and 1220875
4 * LAB # 15   : Advanced selection in C++
5 * CLASS       : CS1A
6 * SECTION     : MW: 8am
7 * DUE DATE   : 4/19/21
8 ****
9 #include <iostream>
10 #include <iomanip>
11 #include <cstring>
12 using namespace std;
13
14
15 int main()
16 {
17     ****
18     * CONSTANTS
19     *
20     * OUTPUT - USED FOR CLASS HEADING
21     *
22     * PROGRAMMER : Programmer's Name
23     * CLASS      : Student's Course
24     * SECTION    : Class Days and Times
25     * LAB_NUM    : Lab Number (specific to this lab)
26     * LAB_NAME   : Title of the Lab
27     * PROBLEM    : Problem number.
28     ****
29
30     const char PROGRAMMER[] = "Andrew Gharios and Jiaqi Li";
31     const char CLASS[]      = "CS1A";
32     const char SECTION[]    = "MW 8:00a - 10:30a";
33     const int LAB_NUM        = 15;
34     const char LAB_NAME[]   = "Advanced selection in C++";
35     const int PROB_NUM       = 4;
36
37
38     char classCode;
39     bool invalid;
40
41     ****
42     * OUTPUT - Class Heading
43     ****
44     cout << left;
45     cout << "*****\n";
46     cout << "* PROGRAMMED BY : " << PROGRAMMER << endl;
47     cout << "* " << setw(14) << "CLASS" << ":" << CLASS << endl;
48     cout << "* " << setw(14) << "SECTION" << ":" << SECTION << endl;
49     cout << "* LAB #" << setw(9) << LAB_NUM << ":" << LAB_NAME << endl;
50     cout << "* " << setw(14) << "PROBLEM " << ":" << PROB_NUM << endl;
51     cout << "*****\n\n";
52     cout << right;
53
54
55     do
56     { //do while
57         cout << "Please enter the letter: ";
58         cin >> classCode;
59         classCode = toupper(classCode);
60         invalid = classCode != 'F' &&
61                         classCode != 'S' &&
62                         classCode != 'J' &&
```

```
63             classCode != 'R';
64
65     if (invalid)
66     {
67         cout << classCode << " is an invalid input - Please try again!";
68         cout << endl;
69     }
70
71 }while(invalid); //do while
72 cout << classCode << " is valid - Thank you!";
73 return 0;
74
75 } //all
76
```

screen

Saturday, April 17, 2021, 11:41 AM

```
1 ****
2 * PROGRAMMED BY : Andrew Gharios and Jiaqi Li
3 * CLASS          : CS1A
4 * SECTION        : MW 8:00a - 10:30a
5 * LAB #15        : Advanced selection in C++
6 * PROBLEM        : 5
7 ****
8
9 Enter your rank number(-1 to exit): 2
10 Lower
11 Enter your rank number(-1 to exit): 3
12 Lower
13 Enter your rank number(-1 to exit): 4
14 Middle
15 Enter your rank number(-1 to exit): 5
16 Middle
17 Enter your rank number(-1 to exit): 6
18 Middle
19 Enter your rank number(-1 to exit): 7
20 Upper
21 Enter your rank number(-1 to exit): 8
22 Upper
23 Enter your rank number(-1 to exit): -1
```

```
1 /*****  
2 * AUTHOR      : Andrew Gharios and Jiaqi Li  
3 * STUDENT ID : 1449366 and 1220875  
4 * LAB # 15   : Advanced selection in C++  
5 * CLASS       : CS1A  
6 * SECTION     : MW: 8am  
7 * DUE DATE    : 4/19/21  
8 *****/  
9 #include <iostream>  
10 #include <iomanip>  
11 #include <cstring>  
12 using namespace std;  
13  
14  
15 int main()  
16 {  
17     /*****  
18     * CONSTANTS  
19     * -----  
20     * OUTPUT - USED FOR CLASS HEADING  
21     * -----  
22     * PROGRAMMER : Programmer's Name  
23     * CLASS      : Student's Course  
24     * SECTION    : Class Days and Times  
25     * LAB_NUM    : Lab Number (specific to this lab)  
26     * LAB_NAME   : Title of the Lab  
27     * PROBLEM    : Problem number.  
28 *****/  
29  
30     const char PROGRAMMER[] = "Andrew Gharios and Jiaqi Li";  
31     const char CLASS[]      = "CS1A";  
32     const char SECTION[]    = "MW 8:00a - 10:30a";  
33     const int LAB_NUM       = 15;  
34     const char LAB_NAME[]   = "Advanced selection in C++";  
35     const int PROB_NUM      = 5;  
36  
37     const int STRN_SIZE    = 30;  
38  
39     int rank;  
40     char output[STRN_SIZE];  
41  
42     /*****  
43     * OUTPUT - Class Heading  
44     *****/  
45     cout << left;  
46     cout << "*****\n";  
47     cout << "* PROGRAMMED BY : " << PROGRAMMER << endl;  
48     cout << "* " << setw(14) << "CLASS" << ":" << CLASS << endl;  
49     cout << "* " << setw(14) << "SECTION" << ":" << SECTION << endl;  
50     cout << "* LAB #" << setw(9) << LAB_NUM << ":" << LAB_NAME << endl;  
51     cout << "* " << setw(14) << "PROBLEM " << ":" << PROB_NUM << endl;  
52     cout << "*****\n\n";  
53     cout << right;  
54  
55  
56     /*****  
57     * Code - Code takes in your rank number and compares it to the classes  
58     * using the conditional operator and outputs your rank class.  
59     *****/  
60     cout << "Enter your rank number(-1 to exit): ";  
61     cin >> rank;  
62     cin.ignore(1000, '\n');
```

```
63
64     while(rank > -1)
65     {
66         (rank <= 3)? strncpy(output, "Lower", STRN_SIZE)
67             : (rank >= 7)? strncpy(output, "Upper", STRN_SIZE)
68             : strncpy(output, "Middle", STRN_SIZE);
69         cout << output << endl;
70
71         cout << "Enter your rank number(-1 to exit): ";
72         cin >> rank;
73         cin.ignore(10000, '\n');
74     }
75
76     return 0;
77 }
78
79
```