

CSC 150

PRELAB #4

Purpose:

1. Use conditional expressions, relational operators, **if**, **else**, and **else if** statements.
2. Use Boolean (logical) operators
3. Use nested if statements
4. Use switch statements.

I. Conditional expressions

Assume the following declarations before each **if** statement is executed. Mark (T) if the statement evaluates to true and (F) if the statement evaluates to false. If the statement results in an error, mark it N/A

```
int a = 12;
int b = 10;
int c = 4;
```

```
int d = 0;
int e = 1;
int f = 2;
```

- | | |
|-----------------------------------|---------------------------------------|
| a) <u>T</u> if (a - 2 <= b) | i) <u>T</u> if (b % c != 0) |
| b) <u>F</u> if (a / c == c) | j) <u>T</u> if (b++ == 11) |
| c) <u>T</u> if (a % c == 0) | k) <u>N/A</u> if (++b == 11) |
| d) <u>T</u> if (a - b == f) | l) <u>T</u> if (d = 0) |
| e) <u>T</u> if (b - a / f >= 0) | m) <u>F</u> if (b * c % c == 0) |
| f) <u>T</u> if (e != 0) | n) <u>N/A</u> if (!e) |
| g) <u>F</u> if (b % 2 != 0) | o) <u>F</u> if (f == a % c) |
| h) <u>F</u> if (a - b < 0) | p) <u>F</u> if (a % c <= f * d - b) |

II. The basic **if** and **if else** statements

Given the following program.

```
#include <iostream>
using namespace std;
int main()
{
    int num1;

    cout << "Enter a number: ";
    cin >> num1;

    if ( num1 < 100 )
        cout << "The number is less than 100" << endl;

    if ( num1 > 100 )
        cout << "The number is greater than 100" << endl;
    return 0;
}
```

a) If you run this program and enter the values below, what happens? Enter the letter of the response that describes your results

- A. Nothing gets printed to the screen
- B. The number is less than 100 -- gets printed to the screen
- C. The number is greater than 100 -- gets printed to the screen
- D. The number is less than 100
The number is greater than 100 -- both get printed to the screen

- 1. 50 B
- 2. 100 D
- 3. 150 C
- 4. 101 C
- 5. -100 B

b.) How could you modify this code so that the value 100 is explicitly handled?

use \leq or \geq

c.) Write two separate **if** statements after the following code to print “The number was even.” if num1 is even or print “The number was odd.” if num1 is odd.

```
int num1;

cout << "Enter a number: ";
cin >> num1;

if ( num1 % 2 == 0 )
    cout << "The number was even" << endl;
if (num1 % 2 == 1)
    cout << "The number was odd: << endl;
```

d.) The same result in item c. above could be accomplished by using an **else** instead of a second **if** statement. Write the **if .. else** structure here that could replace the two **if** statements in section c).

```
int num1;

cout << "Enter a number: ";
cin >> num1;
if ( num1 % 2 == 0 )
    cout << "The number was even" << endl;
else (num1 % 2 == 1)
    cout << "The number was odd: << endl;
```

e.) Write a series of **if – else if – else** statements following the code to determine the tax due for a single person, where the rates are as follows:

- **10%** on income between \$0 and \$8,025
- **15%** on the income between \$8,025 and \$32,550; *plus* \$802.50
- **25%** on the income between \$32,550 and \$78,850; *plus* \$4,481.25
- **28%** on the income between \$78,850 and \$164,550; *plus* \$16,056.25
- **33%** on the income between \$164,550 and \$357,700; *plus* \$40,052.25
- **35%** on the income over \$357,700; *plus* \$103,791.75

```
double income = 0.0;
double tax = 0.0;

cout << "Enter an income: ";
cin >> income;

if ( income >= 0 || income <= 8025)
{
    tax = 0.10 * income;
    cout << "You owe " << tax << endl;
}
else if ( income >= 8025 || income <= 32550)
{
    tax = (.15 * income) + 802.50;
    cout << "You owe " << tax << endl;
}
else if ( income >= 32550 || income <= 78850)
{
    tax = (.25 * income) + 4481.25;
    cout << "You owe " << tax << endl;
}
```

```

else if ( income >= 78850 || income <= 164550)
{
    tax = (.28 * income) + 16,056.25;
    cout << "You owe " << tax << endl;
}
else if ( income >= 164550 || income <= 357700)
{
    tax = (.33 * income) + 40052.25;
    cout << "You owe " << tax << endl;
}
else ( income >= 357700)
{
    tax = (.35 * income) + 103791.75;
    cout << "You owe " << tax << endl;
}

```

III. Logical operators

a.) Assume the following declarations before each if statement. Mark **(T)** if the statement evaluates to true and **(F)** if the statement evaluates to false.

```

int x = 1;
int y = 4;
int z = 14;

```

- 1.) F if (x <= 1 && y == 3)
- 2.) T if (x <= 1 || y == 3)
- 3.) F if (!(x > 0))
- 4.) T if (!(x < 1 || y == 3))
- 5.) T if (x > 1 && y == 4 || z < 15)

b.) Write two compound **if** statements (statements using AND or OR), the first of which will determine that num1 is between 10 and 100 inclusive; the second one will determine that num1 is not between 10 and 100 inclusive. Each statement will display its determination, if true. Do not write an if...else statement.

Example program run:

```

enter a number: 52<enter>
The number 52 is between 10 and 100

enter a number: 197 <enter>
The number 197 is not between 10 and 100

```

c.) Write a single statement that will determine if two values, num1 and num2, are both larger than or equal to 100.

IV. The Nested **if** statement.

Given the program:

```

#include <iostream>
using namespace std;
int main()
{
    int num1;
    cout << "Enter a number: ";
    cin >> num1;

    if ( num1 >= 10 )
    {
        if ( num1 <= 100 )
            cout << "The number is between 10 and 100" << endl;
        else
            cout << "The number is greater than 100" << endl;
    }
    else
        cout << "The number is less than 10.";
    return 0;
}

```

a.) Run the program and enter the following values, indicating what output was displayed. Use the appropriate letter provided.

- A. "The number is greater than 100"
- B. "The number is between 10 and 100"
- C. "The number is less than 10"
- D. Nothing displayed

1.) 1 C

2.) 10 B

3.) 100 B

4.) 101 A

Would the program above function exactly the same if the curly braces ({ }) surrounding the interior if...else pair were removed? Circle one: YES NO

V. Switch

Convert the if...else block in the following program to a switch.

```
#include <iostream>
#include <cctype>
using namespace std;

int main( )
{
    char choice = 'z';

    cout << "A - Attend Classes \n";
    cout << "N - Nap During Class \n";
    cout << "S - Skip Class \n";

    cout << "Enter your choice: ";
    cin >> choice;

    choice = toupper( choice );

    cout << endl;

    //rewrite just this section
    Switch ( choice )
        case 1: (choice == 'A')
            cout << "You're a good student!" ;
            break;
        case 2: (choice == 'N')
            cout << "Well, at least you show up." ;
            break;
        case 3: (choice == 'S')
            cout << "You won't learn that way." ;
            break;
        default:
            cout << "Invalid choice.";
            break;
    //end of rewrite section

    cout << endl << endl;

    return 0;
}
```

VI. Textbook Learn by Doing Exercises

- Section 7.4 (page 192)

1.

```
#include <iostream>
using namespace std;

int main ()
{
    int x

    cout << " - Main Menu -" << endl << endl << endl;
    cout << "1. Enter name" << endl;
    cout << "2. Enter Test Scores" << endl;
    cout << "3. "Display test scores" << endl;
    cout << "9. "Exit" << endl << endl << endl << endl;
    cout << "Please enter your choice from the list above:";

    cin >> x

    switch (x)
    {
        case 1: ( x == 1)
            cout << "Please enter name" << endl;
            break;
        case 2: (x == 2)
            cout << "Please enter test scores" << endl;
            break;
        case 3 (x == 3)
            cout << "Here are the test scores" << endl;
            break;
        case 4 ( x == 9)
            cout << "Now exiting" << endl;
            break;
        default
            cout << "please try again" << endl;
            break;
    }

    return (0)
}
```

2.

```
include <iostream>
using namespace std;

int main ()
{
    int octane

    switch (octane)
    {
        case 1 ( octane == 87)
            cout << "Regular Unleaded";
```

```
        break;
    case 2 ( octane == 89)
        cout << "Unleaded Plus";
        break;
    case 3 ( octane == 92)
        cout << "Premium";
        break;
    default
        cout << "Diesel";
}
return (0);
}
```