General Instructions

- DO NOT WRITE YOUR NAME ON ANY PAGE EXCEPT THIS ONE!
- You have 50 minutes
- **Pace Yourself!!!!**

Pay attention to the point values. When there are 10 minutes left, skim through and be sure you have at least written *something* for the questions that are worth many points.

- Read *all* the directions *carefully* on each problem.
- Good luck.
1. (30 pts) Write a complete C++ program to solve the following problem, including

- an opening comment (don’t put your name in the comment! -2 pts if you do!)
- all necessary “stuff” that goes before the main program
- a full main program complete with comments

**Problem Statement:** Ask the user of the program to input two positive integers. Then print a message indicating whether the larger is a multiple of the smaller one, or not. If the two numbers are the same, indicate that.

**Examples:**

<table>
<thead>
<tr>
<th>input</th>
<th>output</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 3</td>
<td>9 is a multiple of 3</td>
</tr>
<tr>
<td>7 8</td>
<td>8 is not a multiple of 7</td>
</tr>
<tr>
<td>7 49</td>
<td>49 is a multiple of 7</td>
</tr>
<tr>
<td>5 5</td>
<td>Both numbers input were 5</td>
</tr>
</tbody>
</table>

Your program should provide appropriate prompts to the user, and should also label the output appropriately and neatly. Your program should also check for an error condition: if either of the numbers input is negative or zero, then print an error message, and terminate the program immediately.
Extra space in case you need it
2. (10 pts) In lab3, you wrote a function called “outlineBox” that took three parameters, and produced boxes such as the following:

\[
\text{outlineBox}(5,3,\text{'b'});
\]

\[
\text{outlineBox}(3,7,\text{''*''}); \\
* * * \\
********
\]

The function \texttt{drawL} in the program listed below should operate in a similar manner. Complete the function \texttt{drawL} according to the instructions given.

The function should draw a picture on standard output in the shape of the letter L of the given height and width, followed by a blank line.

If either height or width is less than 2, the function simply draws nothing (no error message is produced, and no blank line is printed; the function just returns.)

A complete program to use this function appears below (with the body of function \texttt{drawL} omitted), with sample output on the following page. You may fill in the function in the space provided, or rewrite the complete function in the blank space on the next page (beside or below the sample output.)

```cpp
// e02.cc Exam question for CISC181
// P. Conrad, 10/04/04

#include <iostream>
using namespace std;

void drawL(int height, int width, char c)
{

}

int main(void)
{
    drawL(2,2,\text{'s'});
    drawL(3,2,\text{'y'});
    drawL(4,3,\text{'x'});
    drawL(2,1,\text{'a'});
    drawL(3,5,\text{'z'});
    return 0;
}
```
Output:

```bash
> g++ e02.cc
> ./a.out
s
ss
y
y
yy
x
x
x
xxx
z
z
zzzzz
>
```
3. Number conversions:
   
   (a) (3 pts) Convert 73 from decimal to binary

   (b) (3 pts) Convert 2A from hexadecimal to decimal

   (c) (3 pts) Convert the following from binary to hexadecimal:
   
   1100 0001 1000 0001 0010 1111 1010 1011

   (d) (3 pts) Convert the following from octal to binary:
   
   751
Extra space in case you need it
4. Consider the C++ program on the following page.

(a) (4 pts) Give the output when the input is 5

(b) (4 pts) Give the output when the input is 10

(c) (3 pts) Find every example of the stream extraction operator in the program on the following page and circle it.
   Do NOT circle anything that is NOT a stream extraction operator.
   If you make a mistake, find some other way to indicate clearly what IS and IS NOT a stream extraction operator.

(d) (2 pts) List two relational operators that are in C++ but do NOT appear in this program (give the C++ symbols.)
```
#include <iostream>
using namespace std;

int main(void)
{
    int x;
    cout << "Enter x: ";
    cin >> x;

    int i=1;
    while (i < x)
    {
        cout << "*";
        i +=3;
    }
    cout << endl;
}
```
Unix Commands

5. (2 pts) Which of the following Unix commands creates a new directory:
   Circle one: (a) chmod  (b) pwd   (c) cd   (d) mkdir

6. (2 pts) Read this one carefully before answering.

   Which of the following is the directory where a web page accessed via http://udel.edu/~jsmith/cisc181 would be stored on strauss?
   Circle one:
   (a) ~jsmith/public_html
   (b) ~jsmith/cisc181
   (c) ~jsmith/cisc181/index.html
   (d) ~jsmith/public_html/cisc181

7. (2 pts) Which of the following would be used to change the file access permissions (e.g. to make a web directory readable by others)?
   Circle one: (a) chmod  (b) pwd   (c) cd   (d) mkdir

Short Answer

8. (1 pts) Is the stream insertion operator used with cin or cout?

9. (2 pts) In the C++ statement \( a = b + 7 \times 4; \)
    what is the left operand of the assignment operator?

10. (2 pts) In the C++ statement \( a = b + 7 \times 4; \)
     what is the right operand of the addition operator?
Multiple Choice

11. (2 pts) Which of the following tests whether $x$ is equal to 10?
   
   (a) $if (x == 10)$  (b) $if (x = 10)$

12. (2 pts) Which of the following assigns the value of 2 times $y$ to $x$?
   
   (a) $x == 2 * y$;  (b) $2 * y = x$;  (c) $x = 2 * y$;  (d) $x = 2 * y$;

13. (2 pts) The C++ statement $x = x / 2;$ is equivalent to which of the following statements?
   
   (a) $x /= 2;$  (b) $x += 2;$  (c) $x = 2;$  (d) $x = 2 / x$;
Working with C++ programs

14. Suppose you have a C++ program in a file named `lab03.cpp`. What Unix command do you enter to perform each of the following operations?

(a) (2 pts) Enter a text editor to make changes to the program

(b) (2 pts) Display the contents of the source code on your screen.

(c) (2 pts) Compile the program

(d) (2 pts) Copy the program to a new file called `lab03b.cpp`. 
**Short Answer**

15. When we write `int main(void)` at the beginning of a C++ program, it indicates that `main` should return a value of type `int`.

Explain:

- (2 pts) *What* value is typically returned to indicate “success”?

- (2 pts) *How* can that value (or any other value returned) be retrieved from the Unix shell?

- (2 pts) *Why* is this useful? (or to put it another way, what is the purpose of this mechanism for returning values to the shell?) /beBrief
16. (2 pts) Your CISC181 web page has the URL http://udel.edu/~userid/cisc181. Which of the following files controls the content of that page?

(a) ~/cisc181/index.html
(b) /public_html/index.html
(c) ~/public_html/index.html
(d) /public_html/cisc181/index.html
(e) ~/public_html/cisc181/index.html
Total Points: 100