More Examples Using Functions and Command-Line Arguments in C++

CS 16: Solving Problems with Computers I
Lecture #6

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Administrative

- **CHANGED T.A. OFFICE/OPEN LAB HOURS!**
  - Thursday, 10 AM – 12 PM Muqsit Nawaz
  - Friday, 11 AM – 1 PM Xiyou Zhou
- Linux Workshop **THIS** Week!
  - HFH Conference Room (HFH 1132)
  - Friday, April 20th, 1:00 – 2:30 PM
  - Material will be put up on the class website
- Your 1st Midterm Exam is NEXT TUESDAY (4/24)!!!
  - ***Omgomgomgomgomgomgomgomgomg***

MIDTERM IS COMING!

- **Tuesday, 4/24** in this classroom
- **Starts at 2:00 PM **SHARP****
  - Please start arriving 5-10 minutes before class
- **I may ask you to change seats**
- Please bring your UCSB IDs with you

- **Closed book**: no calculators, no phones, no computers
- ***Only*** allowed ONE 8.5”x11” sheet of notes − one sided only
  - You have to turn it in with your exam
- **You will write your answers on the exam sheet itself.**

What's on the Midterm#1?
From the Lectures, including…

- Intro to Computers, Programming, and C++
- Variables and Assignments
- Boolean Expressions (comparison of variables)
- Input and Output on Standard Devices (cout, cin)
- Data Types, Escape Sequences, Formatting Decimal
- Arithmetic Operations and their Priorities
- Boolean Logic Operators
- Flow of Control & Conditional Statements
- Loops: for, while, do-while
- Types of Errors in Programming
- Multiway Branching and the switch command
- Generating Random Numbers
- Functions in C++:
  pre-defined, user-defined
  void functions, the main() function
  call-by-ref vs. call-by-value
- Command Line Inputs to C++ Programs

Midterm Prep

1. Lecture slides
2. Lab programs
3. Homework problems
4. Book chapters 1 thru 5*

   *check which lecture slides go with it!!

Example Questions for Midterm #1

Sample Question
Multiple Choice

Complete the following C++ code that is supposed to print the numbers **2 3 4 5 6** (with spaces in between):

```
int c = 0;
while (_____________)
{
    cout << c+2 << " ";
    c++;
}
```

A. c < 7
B. c > 5
C. (c + 2) < 6
D. (c + 2) != 6
E. c < 5

Sample Question
Multiple Choice

What is the exact output of this C++ code?

```
int prod(1);
for (int m = 1; m <= 5; m += 2)
{
   prod *= m;
}
cout << "Total product is: " << prod << endl;
```

A. Total product is: 720
B. Total product is: 90
C. Total product is: 15
D. Total product is: 3
E. Total product is: 1

Sample Question
Short-Answer Coding

```
#include <iostream>
using namespace std;
int findMax2(int a, int b);
int main()
{
   int x, y;
   cout << "Enter 2 numbers: ";
   cin >> x >> y;
   cout << "The biggest of these is: " << findMax2(x, y);
   return 0;
}
int findMax2(int a, int b)
{
   int max = a;
   if (b > a)
   {
      max = b;
   }
   return max;
}
```

Complete this program in C++. Use what's given as clues for what's missing.

Sample Question

Coding Syntax: ***Find 10 Mistakes (ignore styling)***

```
1   #include <iostream>
2   #include <stringer>
3   using namepaces std;
4
5   int main () {
6     int number; x = 0;
7     string word;
8
9     cout << "Enter an integer: /n";
10    cin >> number
11    cout << "Enter a string: \n";
12    cin << word;
13
14    while (x < number);
15    {
16       cout << words << " ";
17       x+++;
18    }
19    cout >> endl; return 0;
20  }
```

2: Should be: **<string>**

3: Should be: **using namespace std;**

6: Should be: **int number, x = 0;**

9: Should be: **\n**

10: Missing **;** at the end

11: Should be: **cin >> word;**

14: Must remove the **;** at the end

16: Should be: **cout << word << " ";**

17: Should be: **x++**

19: Should be: **cout << endl; return 0;**

Sample Question
Short Program

If we list all the integer numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Write a C++ program that can find the sum of all the integer multiples of 3 or 5 below any number **n** that is given via standard input.

Sample Question
Short Program

If we list all the integer numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23.

Write a C++ program that can find the sum of all the integer multiples of 3 or 5 below any number **n** that is given via standard input.

```
#include <iostream>
using namespace std;
int main()
{
   int sum(0), int n;
   cout << "Enter n: ";
   cin >> n;
   for(int i = 1; i < n; i++)
   {
      if ((i % 3 == 0) || (i % 5 == 0))
      {
         sum += i;
      }
   }
   return 0;
}
```

Lecture Outline

- Using and Interpreting Gradescope

- More Examples of Functions in C++
- More Examples of Command-Line Use in C++

- Makefiles

Checking stdout from ./change < 1_general.in (8.0/8.0)

Checking stdout from ./change < 2_single.in (10.0/10.0)

Checking stdout from ./change < 3_multiple.in (10.0/10.0)

Checking stdout from ./change < 4_quit.in (2.0/2.0)

Checking stdout from ./change < 5_hidden1.in (10.0/10.0)

Checking stdout from ./change < 6_hidden2.in (10.0/10.0)

Checking stderr from ./calculate 42 x (0.0/3.0)

```
--- expected
+++ actual
@@ -1 +1 @@
-Number of arguments is incorrect.
+Segmentation fault
```

Interpretation:
Student probably did not account for this type of error

Checking stderr from ./calculate 68 % 10 -87 (3.0/3.0)

Checking stdout from ./calculate -33 x 24 (3.0/3.0)

A summary of what tests failed and what passed

STUDENT

AUTOGRADER SCORE

/ 100.0

FAILED TESTS

Checking stderr from ./calculate 42 x (0.0/3.0)

PASSED TESTS

Checking stdout from ./change < 1_general.in (8.0/8.0)
Checking stdout from ./change < 2_single.in (10.0/10.0)
Checking stdout from ./change < 3_multiple.in (10.0/10.0)
Checking stdout from ./change < 4_quit.in (2.0/2.0)
Checking stdout from ./change < 5_hidden1.in (10.0/10.0)
Checking stdout from ./change < 6_hidden2.in (10.0/10.0)
Checking stderr from ./calculate 68 % 10 -87 (3.0/3.0)
Checking stdout from ./calculate -33 x 24 (3.0/3.0)
Checking stdout from ./calculate 59 + 53 (2.0/2.0)
Checking stdout from ./calculate 88 % 94 (3.0/3.0)
Checking stdout from ./calculate -21 x -67 (3.0/3.0)
Checking stdout from ./calculate 93 + -98 (2.0/2.0)
Checking stdout from ./calculate -92 + 31 (2.0/2.0)
Checking stdout from ./calculate -68 x -37 (3.0/3.0)
Checking stdout from ./calculate 95 x 40 (2.0/2.0)
Checking stdout from ./calculate 0 + 0 (2.0/2.0)

Watch Out For…

- The use of cerr vs cout (esp. in this lab)
  - Use **cerr** when relaying **error messages**
  - Use **cout** for **regular standard output**

- When you create your programs, test them with as many different scenarios and "edge cases" as you can
  - So that you can catch errors and understand where/why they occur

More DEMOS! ☺☺☺

- function_example1.cpp
- function_example2.cpp
- args.cpp

YOUR TO-DOs

- ❑ STUDY FOR YOUR EXAM! ☺
- ❑ Finish Lab3 by next Monday
- ❑ Prepare Lab4 for next Wednesday
- ❑ Do HW6 by next Tuesday

- ❑ Go to the Linux Workshop on Friday (optional, but recommended)!
- ❑ Visit Prof's and TAs' office hours if you need help!

- ❑ Call your parents and say hello

</LECTURE>