

Queens College
CS111
Instructor: Kangmei Yang

Department of Computer Science
Midterm1 Exam Spring 2020 3.10.20

Complete all of the following information.

STUDENT LAST NAME (PRINT): LOUIS

STUDENT FIRST NAME (PRINT): LOUBENS

LAB INSTRUCTOR'S NAME (PRINT): Rebecca Schley

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SIGNATURE: 

THIS IS A CLOSED BOOK TEST. NO BOOKS, NOTES, COMPUTERS, CELL PHONES, OR CALCULATORS ARE ALLOWED.

The exam has 4 problems; you should answer all of them.

Answer the problems in the spaces provide.

Problem:	01	02	03	04	Σ
Grade:	8	6	2	7	23

Seat#: B14

Version: E

Problem 1 (10 points)

Write a complete C++ program that does the following. (Programs that correctly carry out some of the tasks will receive partial credit.)

Excessively long program over 20 lines will lose points.

1. It asks the user to enter two positive integers a and b, each integer should has 3 or more digits.
2. It terminates the program if any entered number is illegal.
3. The program then prints the user's number with more digits, in case there's tie, print both.

Here's an example of how the program should work:

Enter two 3-digit or more positive integers: 456 987

The number with more digits is/are 456 987

```
#include <iostream>
using namespace std;
int main() {
    int a = 0; b = 0; c = 0; d = 0;
    cout << "Enter two positive numbers of\n";
    << 3 OR more digits. Hit ENTER after each number: \n";
    cin >> a >> b;

    while (a < 100 || b < 100) {
        cout << "3-digit numbers OR more: \n";
        cin >> a >> b;
    }

    while (a != 0) {
        a % 10; a = a / 10;
        c++;
    }

    while (b != 0) {
        b % 10; b = b / 10;
        d++;
    }

    if (c > d) { cout << "the number with more digits is " << a; }
    else if (d > c) { cout << "the number with more digits is " << b; }
    else if (c == d) { cout << "the number with more digits are " << a << b; }

    return 0;
}
```

Problem 2 (10 points) No Partial Credit

Write C++ statements to carry out the following tasks. Do not write complete programs, just give a single line of C++ code. No answer can use more than four lines of code.

Assume that integer variables x, y, and string variable z has been declared and initialized.

- (a) If $x < y < 10$, replace x by 10

Answer:

```
if (x < y && x < 10) {  
    x = 10;  
}
```

- (b) Print first x perfect squares (each on its own line, start from 1 then 4 then 9 and on)

Answer:

- (c) Print the exact quotient of x and y.

Answer:

```
double z = x / y;  
cout << z
```

- (d) Repeatedly read in a new input of z when z is not John.

Answer:

```
while (z != "John") {  
    cout << "Try again: ";  
    cin >> z;  
}
```

- (e) Print the last digit of x, if x is negative, negate x to remove negative sign first.

(Note: last digit is first digit from right.)

Answer:

```
cout << x % 10;  
if (x < 0) {  
    x *= -1;  
}
```

Problem 3 (10 points) No Partial Credit

Consider the following C++ program.

```
2 int main() {  
    int x = 3, y = 111, z = 123;  
  
    string mike = "Michael";  
  
    cout << x << "x" << mike << "=" << z << endl; //line a  
  
    cout << (100 % y) << (y / 10) << "\nnn"; //line b  
  
    if ((x % 3 != 0) && (x < 4)) cout << x + y << endl; //line c  
    else cout << y - x << endl;  
  
    for (int c = y; c <= z; c += 3) cout << c; //line d  
    cout << endl;  
  
    for (int i = 1; i <= 2; i++) { //line e  
        for (int j = 2; j <= x; j++) cout << i << j;  
        cout << endl; }  
  
    return 0;  
}
```

(a) Output start at line a:

3 x Michael = 123

(b) Output start at line b:

011
nn

(c) Output start at line c:

108

(d) Output start at line d:

111
114
117
120
123

(e) Output start at line e:

12
23

Problem 4 (10 points)

Write a complete C++ program that asks the user for a positive number n . Then the program prints a vertical zig-zag shape of $*$ with n lines that has width n . (Program doesn't need to validate the input. Excessively long programs over 18 lines will lose points.)

An example run of the program follows.

Enter a positive integers: 4

```
* #include <iostream>
* using namespace std;
* int main() {
*
*     int n = 0;
*     cout << "Enter a positive number: ";
*     cin >> n;
*
*     for (int R = 1; R <= n; R++) {
*         for (int c = 1; c <= n; c++) {
*             if (R == c || c - 1 == R)
*                 cout << " * ";
*         }
*         cout << endl;
*     }
*     return 0;
* }
```

