Introduction to Computing
CS 151 - ON60
Department of Physics and Computer Science
Medgar Evers College
Exam 1

Direction: Submit your typed work in the Exams directory of your github repository and/or as an attachment on Google classroom under the Exam01 assessment. All submissions should have their appropriate extensions.

Problem	Maximum Points	Points Earned
Fundamentals	5	
Problem Solving	5	
Tracing	5	
Debugging	5	
Total	20	

Fundamentals

1. **For each of the following questions, write ONLY what is requested.**

   a. State the rule for identifiers (the naming rule).

   b. Given that an int variable t has been initialized, write a statement(s) that declares a new variable and assign it the quotient of 5 times 8 less than t divided by 3.

   c. Write a statement(s) that prompts for and reads in a name.

   d. Write a statement(s) that initializes the variables named a, b, c and d to `"three"`, `65`, `'y'` and `false` respectively.

   e. Write a statement(s) that displays a 6×6 square of asterisks.

Problem Solving

2. **A composition function is a function whose result is the result of a function that uses the result of another function as an input. That is, if $f(x)$ and $g(x)$ are functions, we say that f compose g of x denoted $(f \circ g)(x)$, which means $f(g(x))$, is a composition function. To elaborate, you evaluate a composition function $(f \circ g)(x)$**

   1. **evaluate the inner function g with the initial input x ($y = g(x)$); and then,**
   2. **evaluate the outer function f with the result of the evaluation of $g(x)$ ($h = f(y)$)**

   Your objective is to write a complete program that can evaluate the composite functions $(g \circ f)(x)$ and $(f \circ g)(x)$ where

   $$g(x) = -4x^2 + 8x - 1 \text{ and } f(x) = 2x^2 - 3x + 4$$

   for any real number, x. The program should

   1. **prompt and read in a real number for a variable *x***
   2. **display the result of the composition of $g(f(x))$ preceeded by the string `"g(f(x)) = "` where *x* is the value of *x* on their own line**
   3. **display the result of the composition of $f(g(x))$ preceeded by the string `"f(g(x)) = "` where *x* is the value of *x* on their own line**

   For instance, if the input is `2.5`, then the program will display

```
g(f(2.5)) = -253
f(g(2.5)) = 94
```

Tracing

3. **Construct a trace table (or list) of the main function below using the input (`6`).**

```
int main()
{
  int a1, a2, a3, e;
  a1 = 12;
  a2 = 25;
  a3 = 5;

  cin >> e;
  e = e * e % 26 + 1;
  a1 = (a1 + e) % 26;
  a2 = (a2 + e) % 26;
  a3 = (a3 + e) % 26;

  cout << '('<< a1 << ','<< a2 << ','<< a3 << ')';
  return 0;
}
```

Debugging

4. **For each code segment, write ONLY the line number and the entire corrected line for each line that contains a syntax error. Modifications must maintain the intent of the code.**

a. `/*Intent: reads in a value and displays the evaluation of the expression of the value not between 1 and 10*/`

```
01 | int main()
02 | {
03 |   const int x;
04 |
05 |   cin >> x;
06 |
07 |   const bool r = (x < 1) Or (x < 10);
08 |
09 |   cout << boolalpha;
10 |   cout << r
11 |   return 0;
12 | {
```

b. `/*Intent: prompts and reads in a first and last name, and then, displays them in the format:"first - last"*/`

```
01 | main()
02 | {
03 |   String first, last;
04 |
05 |   cout << "Enter first name:  ";
06 |   cin >> first;
07 |   cout << "Enter last name:  ";
08 |   cin >> last;
09 |   cout >> first << " - "<< last << "\n";
10 |   return 0;
11 | }
```

c. `/*Intent: reads in an integer and displays twices its value*/`

```
01 | int main()
02 | }
03 |   int val;
04 |
05 |   cin << val;
06 |   cout << val * 2;
07 |   return 0
08 | }
```