CS 1021C-001 - Spring 2014 - Exam 1
University of Cincinnati

There are 6 questions for a total of 100 points.

Name: _____

Instructions

- Please read through this entire exam very carefully before starting.
- This exam is closed notes and closed books.
- All work must be written on the exam pages in order to be graded. Any scrap paper used, must be the scrap paper provided during the exam period.
- For programming questions: Please be accurate with your C++ syntax: this includes appropriate use of braces, semicolons, and the proper use of upper/lowercase letters.
- No electronic devices may be used during the exam: this includes (but is not limited to) calculators, phones, tablets, and computers.
- You have 55 minutes to complete the exam.

DON'T PANIC!

Question:	1	2	3	4	5	6	Total
Points:	20	20	10	10	20	20	100
Score:							

Multiple Choice and True/False

1. Circle the **best** response.

[2] (a) Every C++ Program must contain a function called:

A. `getX`
B. `main`
C. `startup`
D. `initialization`

Solution: B - main

[2] (b) The input to the compiler is called

A. Source File
B. Machine Code
C. Library Files
D. Executable program

Solution: A - source file

[2] (c) True of False: C++ *requires* that you initialize variables when they are defined.

A. True
B. False

Solution: false, but it is recommend to do so

[2] (d) What is the preferred way to declare a constant in your C++ program?

A. `int MONTHS_IN_A_YEAR = 12;`
B. `#define MONTHS_IN_A_YEAR 12`
C. `const int MONTHS_IN_A_YEAR = 12;`

Solution: C - `const int MONTHS_IN_A_YEAR = 12;`

[2] (e) A C-style string (array of `char`), that contains `"Hello, CS1!"` requires how many bytes of memory to be stored correctly?

A. 13
B. 12
C. 11
D. 10

Solution: B - 12: 11 bytes for the content, and 1 byte for the null terminator

[2] (f) The value of `(int) 34.67` is

A. 34
B. 35
C. None of the above

Solution: A - 34, the value is truncated

2 (g) According to the published coding standards for the class, which is the best choice for a variable name?

A. `pickme`
B. `Pickme`
C. `PickMe`
D. `pickMe`

Solution: D - pickMe

2 (h) Which of the following is a valid identifier for variable name?

A. _x19
B. x&22
C. 22x19
D. none of the above

Solution: A) _x19 is a valid identifier

2 (i) According to good coding style, what should you do on the line of code following a '{' character?

A. add a comment
B. indent
C. use an if statement
D. decrease indentation

Solution: B - indent your code

2 (j) Given the following program definition

```
1 int a;
2 int b = 2;
3 float c = 4.2;
4 a = b * c;
```

What is the value stored in `a`?

A. 8.4
B. 8
C. 0
D. None of the above

Solution: B - 8

Fill in the blank

2. State the value and type of the following expressions, given the following declarations:

```
1 int length = 10;
2 int width = 4;
3 int depth = 22;
4 double weight = 3.5;
5 string label = "Do not bend";
```

2 (a) `length + depth % width`
value: _____ type: `int boolean char double string`

Solution: 12, int

2 (b) `depth / length + 2.0 * width`
value: _____ type: `int boolean char double string`

Solution: 1.0, double

2 (c) `weight * width`
value: _____ type: `int boolean char double string`

Solution: 14.0, double

2 (d) `(width >= 4) || ((length < 11) && (depth <= 22.5))`
value: _____ type: `int boolean char double string`

Solution: true, boolean

2 (e) `!(width == 2)`
value: _____ type: `int boolean char double string`

Solution: true, boolean

2 (f) `label[3] // Accesses the character at index 3`
value: _____ type: `int boolean char double string`

Solution: 'n', char

2 (g) `(int) length + width`
value: _____ type: `int boolean char double string`

Solution: 14, int

2 (h) `label.length() + length`
value: _____ type: `int boolean char double string`

Solution: 21, int

2 (i) `(int)(weight + width)`
value: _____ type: `int boolean char double string`

Solution: 7, int

2 (j) `static_cast<int>(weight)`
value: _____ type: `int boolean char double string`

Solution: 3, int

Short Answer

3. Write a brief response to each question. Please write in complete sentences, using a maximum of 2 sentences.

[5] (a) What is the different between a syntax error and a logic error?

Solution: Syntax errors are error in the construction of the programming language, and are discovered using the compiler. Logic errors are errors in the algorithm used to construct the program and are discovered when running your program or during unit testing.

[5] (b) What is the difference between system software and application software?

Solution: Systems software is usually the operating system, which controls the hardware and allows for the execution of application software. Application software are the programs that computer users interact with, like word processors, web browsers, and games.

Code Analysis

4. Examine the following C++ program and answer the questions below.

```
1 #include <iostream>
2 using namespace std;
3
4 int main() {
5   int x = 40;
6   int y = 60;
7   int z;
8   cout << "x: " << x << " y: " << y << " z: " << z << endl;
9
10  cout << "Enter new values for x, y, and z:" << endl;
11  cin >> x >> y >> z;
12
13  int a = x % z;
14  int b = y % z;
15  int c = a + b;
16  cout << "a: " << a << " b: " << b << " c: " << c << endl;
17  return 0;
18 }
```

5 (a) What is the output of this code?, assuming the user types in `14 27 10` and the presses the `enter` key.

Solution:

```
x:  40 y:  60 z:  <randomvalue>
a:  4 b:  7 c:  11
```

5 (b) What happens if the user fails to hit `enter` after inputing the new values for x, y, and z?

Solution: Nothing... it will just sit there.

20 5. What is the output of this program? Please be accurate with the spacing of the output. I've provided the first line of the output for you, to help with lining up. Use the grid below to ensure proper alignment and formatting of the output.

```
1 #include <iostream>
2 #include <iomanip>
3 using namespace std;
4
5 int main() {
6   int x = 4;
7   int y = 5;
8   double z = 10;
9
10  cout << "01234567891123456789212345678 9" << endl;
11
12  cout << setw(12) << x << setw(12) << y << endl;
13  cout << setw(12) << left << x << setw(12) << left << y << endl;
14  cout << setw(12) << right << x << setw(12) << right << y << endl;
15
16  cout << "x*y = " << setw(1) << x * y << endl;
17
18  double a = y / x;
19  cout << setw(10) << setprecision(5) << a << endl;
20  cout << setw(10) << setprecision(5) << fixed << a << endl;
21
22  double b = y / z;
23  cout << setw(10) << setprecision(5) << fixed << b << endl;
24
25  return 0;
26 }
```

Solution: solution on next page...

0	1	2	3	4	5	6	7	8	9	1	1	2	3	4	5	6	7	8	9	2	1	2	3
											4												5
4												5											
											4												5
x	*	y		=		2	0																
									1														
			1	.	0	0	0	0	0														
			0	.	5	0	0	0	0														

Programming Questions

6. Translate the following mathematical equations into valid C++ expressions. Remember that there are some functions in `<cmath>` that you can use: `pow(x, y)`, and `sqrt`.

[5] (a) $\sqrt{a^2 + b^2}$

Solution: `sqrt(pow(a, 2) + pow(b, 2))`

[5] (b) $t\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$

Solution: `t * (1 / sqrt(1 - pow(v,2)/pow(c,2)))`

[5] (c) Area of a dodecahedron: $3\sqrt{25 + 10\sqrt{5}}a^2$

Solution: `3 * sqrt(25 + 10 * sqrt(5)) * pow(a, 2)`

[5] (d) Volume of a dodecahedron: $\frac{1}{4}(15 + 7\sqrt{5})a^3$

Solution: `1 / 4.0 * (15 + 7 * sqrt(5)) * pow(a, 3)`