Programming and Problem Solving
Winter 2018 – CS110-001 – D. Hepting

Midterm #2 – March 23 @ 12:30 in ED191

Name: _____ Student Number: __ __ __ - __ __ __ - __ __ __

Electronic devices are NOT permitted during the exam. You must maintain the confidentiality of your examination; do not provide any opportunity for others to copy your work. Questions about the exam will not be answered during the exam: if something is unclear to you, please document in your answer any assumptions that you've made. There are 10 multiple choice questions to be answered on the Scantron sheet and 2 other questions to be answered in the space provided on the exam paper. You have 50 minutes to complete the exam. There are 20 marks available on this exam.

Multiple Choice (10 questions x 1 mark each = 10 marks. Answer on Scantron sheet). Choose the *best* answer.

1. What is the index of the first character in a string, accessed either by [] or .at()?
   A. -1
   B. 1
   C. 0
   D. 0.5

2. What is the purpose of a `break;` statement within a loop?
   A. to cause a run-time error
   B. to pause execution of the program
   C. to end the current iteration of the loop
   D. to end the loop innermost loop that contains the `break;` statement

3. What is printed as the value of sum at the end of the following code snippet?

```
int sum = 0;
for (int i = 0; i < 10; i++)
{
    int sum = 10 + i;
}
cout << "sum = " << sum << endl;
```

   A. this code will not compile
   B. 0
   C. 19
   D. 10

4. Given the following code snippet:

```
string s1 = “zoo”;
string s2 = “zebra”;
cout << (s1 < s2 ? s1 : s2) << endl;
```

   what will be displayed, and why?
   A. s2, because zebra < zoo
   B. zebra, because e comes before o in the alphabet
   C. s1, because zoo < zebra
   D. zoo, because its length is shorter

5. The body of any do-while loop guaranteed to execute how many times?
   A. 0
   B. 1
   C. depends on the loop continuation condition
   D. infinitely many

6. What will be displayed, and why, from the following code snippet?

```
cout << ("c" == 'c') << endl;
```

A. nothing, because this code has an error in it
B. 1 (or true), because both literals store the letter c
C. 0 (or false), because both literals store the letter c differently
D. none of the above are true

7. Under what values of `input` will the error message be displayed?

```
char input;
cin >> input;
if (input != 'a' || input != 'b' || input != 'c')
{
    cout << "error!" << endl;
}
```

A. a, b, or c
B. a, b, and c
C. none of a, b, or c
D. any

8. `for (;loop-continuation-condition;) {/* loop */}` is equivalent to :

A. `for (int i = 0;i < 10;i++) {/* loop */}`
B. `while (loop-continuation-condition) {/* loop */}`
C. `do {/* loop */} while (loop-continuation-condition);`
D. none of the above

9. `static_cast<char>('a' + rand() % ('z' - 'a' + 1))` is equivalent to:

A. `static_cast<char>('a' + rand() % 26)`
B. `(char)('a' + rand() % 26)`
C. A and B
D. Neither A nor B

10. If `static_cast<char>('a' + rand() % 26)` was repeated several times in a program, the characters produced would be:

A. Different and not random
B. Different and random
C. Same
D. All uppercase

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Answer both the Code Tracing and Programming questions in the space provided (inside the boxes). Electronic devices are NOT permitted during the exam. Questions about the exam will not be answered during the exam: if something is unclear to you, please document in your answer any assumptions that you've made.

Code Tracing Question (4 marks):

Trace the execution of the following code with input of `160`.

In the space for your answer, use the leftmost column for line numbers. Use a column for each variable declared or modified in the program. If the variable `var` is assigned the value 10 on line 50, you would have a row in your trace table with 50 in the Line# column and 10 in the column for var.

```
 1  #include <iostream>
 2  #include <string>
 3  using namespace std;
 4  int main()
 5  {
 6          // Prompt the user to enter a decimal integer
 7          cout << "Enter a decimal number: ";
 8          int decimal;
 9          cin >> decimal;
10          // Convert decimal to hex
11          string hex = "";
12          while (decimal != 0)
13          {
14                  int hexValue = decimal % 16;
15                  // Convert a decimal value to a hex digit
16                  char hexDigit = (hexValue <= 9 && hexValue >= 0) ?
17                          static_cast<char>(hexValue + '0') :
18                          static_cast<char>(hexValue - 10 + 'A');
19                  hex = hexDigit + hex;
20                  decimal = decimal / 16;
21          }
22          cout << "The hex number is " << hex << endl;
23          return 0;
24  }
```

Line#							

Programming Question (6 marks):

Write a readable C++ program, with meaningful comments, that accepts input of zero or more integer measurements of precipitation, until a negative value is encountered. From this input data, calculate and output the average precipitation as well as the minimum precipitation and the number of times that this value occurred in the input.