CSci 1113
Quiz

Name: ________________________________________

Student ID: ________________________________

Instructions: Please pick and answer any 6 of the 7 problems for a total of 60 points. If you answer more than 6 problems, only the first 6 will be graded. The time limit is 50 minutes. Please write your answers in the space provided. The exam is open book and notes. You may use electronic devices to ONLY look at either an e-book version or electronic notes. You may not use the internet, compiler or any other outside resources. (If you are typing on your keyboard/input device for anything other than ctrl-F to find words in the e-book or notes, this is probably not acceptable.)

Problem (1) [10 points] Assume you have three variables: \(x=4\), \(y=5\), \(z=10\). Write a single C++ statement that will change the values of these variables to: \(x=5\), \(y=4\), \(z=26\). You can only use one semicolon and one equals sign.

Grading breakdown:
2 points: correct \(x\) value
2 points: correct \(y\) value
2 points: correct \(z\) value
3 points: using 1 equals sign
1 point: using 1 semi-colon

Solutions (many ways to answer):
\[z = (x++)*(-y)+z\]
\[z = (x++)+(y--) + 17\]
Problem (2) [10 points] For the following situations, tell what types of variables you would use and what they would store.

(a) You want to find the number of vowels in a word.
(b) You want to find the gravitational attraction between a planet and its moon.
(c) You want to give out grades as A-F or S/N.
(d) You want to find which alphabet letter people’s last names most commonly start with.
(e) You want to find the average number of people wearing hats in the room.

Grade breakdown:
2 points for problem:
-- 1 point, correct type for description
-- 0.5 points, some correct variables
-- 0.5 points, all correct variables

Solution:
(a) int: counting vowels, char/string to store word/letters
(b) a few doubles: a few doubles for gravitational force, and masses of the planet/moon
(c) double/int: for the score
(d) a bunch of ints: one for each letter, char/string to store word/letters
(e) two ints: people with hats and total number of people
Problem (3) [10 points] Write a single if-statement that is true on the range of i values shown. If there is an ellipsis (i.e. ...), this indicates the pattern of numbers continues in that direction.

(Example) int i: ... -2, -1, 0
Answer: if(i <= 0)

(a) int i: -5, 5
(b) int i: 1, 2, 3, ... 99, 100
(c) int i: ... -5, -3, -1, 1, 3, 5, 7, 9, ...
(d) int i: ... -2, -1, 0, 10, 11, 12, ...
(e) int i: ... -4, -3, -2, -1, 0, 1, 3, 5, 7, 9, 10, 11, 12, 13, 14, 15 ...

Grade breakdown:
2 points per problem
(take off only -1 if close)

Solution:
(a) if(i=-5 || i == 5)
(b) if(i > 0 && i <= 100)
(c) if(i%2 == 1)
(d) if(i<= 0 || i > 10)
(e) if( (i<=0 || i>=10) || (i%2 == 1) ) (part c || d)
Problem (4) [10 points] Show how the computer would evaluate the following if-statement for the given values and whether or not the if-statement would run. You must show all work and clearly indicate each step the computer would take for full credit.

\[
\text{if ( (x==y && y==z) || (x + y + z > 0) || (x>y && x>z) )}
\]

(a) \( x = 1, \ y = 2, \ z = 3 \)
(b) \( x = 1, \ y = 1, \ z = 1 \)

Grade breakdown:
4 points: using short circuit evaluation
3 points: showing steps
3 points: correct answer

Solution:
(a) if( (x==y && y==z) || (x+y+z > 0) || (x>y && x>z) )
   if( ( F && y==z) || (x+y+z > 0) || (x>y && x>z) )
      if( ( F && y==z) || ( T ) || (x>y && x>z) )
         if( ( T )

(b) if( (x==y && y==z) || (x+y+z > 0) || (x>y && x>z) )
   if( ( T && y==z) || (x+y+z > 0) || (x>y && x>z) )
      if( ( T && T ) || (x+y+z > 0) || (x>y && x>z) )
         if( ( T ) || (x+y+z > 0) || (x>y && x>z) )
            if( ( T )
Problem (5) [10 points] Give values for $a$ and $b$ to make $x=10$ at the end of this code.

```java
x=3;
if(a < 0) {
    if(b < 0) {
        x++;
    }
    else if(b > 0) {
        x--;
    }
    else {
        x = x * 2;
    }
}
if(a < 5) {
    if(b < 5) {
        x--;
    }
    if(b == 0) {
        x = x * 2;
    }
}
else {
    x = x * 2;
}
```

Grade breakdown:
5 points: value of $a$
5 points: value of $b$
(+2 per $a/b$ variable for partial credit if work shown)

Solution:
$a$ = any negative
$b$ = 0
Problem (6) [10 points] Write a short sentence explaining any problems with this code fragment:

```cpp
int x, y;
cin >> x >> y;
if(x>y) {
    int maximum = x;
}
else {
    maximum = y;
}
```

Grade breakdown:
2 points: mentioning maximum variable
5 points: mentioning scope
3 points: not mentioning x or y

Solutions:
Scope of maximum doesn’t exist outside if/else statements, so it is useless.
(Also, maximum in the else is undeclared due to this problem.)
**Problem (7)** [10 points] Find 3 possible places for errors in the following code (assume no issues with parts not shown, such as #include). Assume no user-defined global variables exist. Explain specifically what causes the error and whether it is a syntax, runtime or logic error:

```cpp
int main()
{
    int x, y;
    cout << "Enter two positive numbers: ";
    cin << x << y;
    if(x > 0 && y > 0)
    {
        cout << "Their average is " << (x+y)/2 << endl;
    }
    else (x <= 0 || y <= 0)
    {
        cout << You don't listen very well... << endl;
    }
}
```

**Grade breakdown:**

**Solution:**
- `(x+y)/2`: logic, integer division will not give average all the time
- `else (x <= 0 || y <= 0)`: syntax, else does not have conditions
- `cout << You don't listen very well... << endl;`: syntax, need quotes around the output
- `cin << x << y;`: syntax, `<<` going the wrong way