15-110 Check2 - Written Portion

Name:

AndrewID:

#1 - Evaluating Boolean Expressions - 10pts

For each of the following Boolean expressions, determine whether it evaluates to `True`, `False`, or an error.

```
(4 > 5) and ("foo" == "foo")
```
  ☐ True
  ☐ False
  ☐ Error

```
(10 > 0) or (0 == 1/0)
```
  ☐ True
  ☐ False
  ☐ Error

```
not (True and False)
```
  ☐ True
  ☐ False
  ☐ Error

```
(2 <= 5) and (4 + "a" == "4a")
```
  ☐ True
  ☐ False
  ☐ Error

```
("a" == "A") or (0 > 1)
```
  ☐ True
  ☐ False
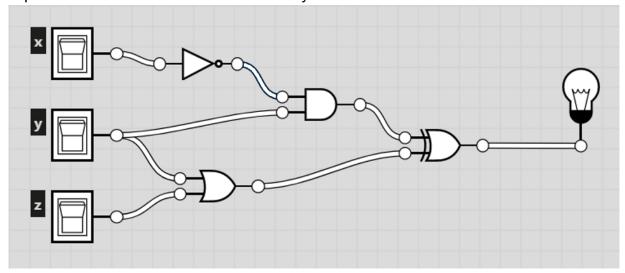 ☐ Error

#2 - Code Tracing Conditionals - 15pts

Given the following block of code, choose specific values for x, y, and z that would lead to the code printing A, B, C, D, or E. If one of the variables could be assigned to any value to achieve the result, write **anything** instead of a value. Fill out your answers in the table below.

```python
if x < 10:
    if y > 20:
        if z == "foo":
            print("A")
    else:
        if y % 2 == 0:
            print("B")
        else:
            print("C")
elif x < 100:
    if y < 0 and z == "bar":
        print("D")
    elif y < 0:
        print("E")
```

Printed Result	x value	y value	z value
A			
B			
C			
D			
E			

#3 - Circuit to Truth Table and Expression - 24pts

Fill out the truth table below to show all possible input combinations and all resulting outputs for the circuit shown here. You may not need to use all the rows.

x value	y value	z value	output value

Write the Boolean expression which is equivalent to the circuit above.

#4 - Full Adder Facts - 6pts

In class and in the lecture slides, we showed how to put together a Full Adder circuit.
For each of the following questions, choose the **best** answer as relates to that circuit.

What are X and Y?
- ☐ The two whole numbers being added
- ☐ Single binary digits of the two numbers being added
- ☐ Two binary digits of the first number being added

What is C_{in}?
- ☐ The third whole number being added
- ☐ A single binary digit of the third number being added
- ☐ The number carried in from the previous addition
- ☐ The remainder of the current addition

Why do we need two output values?
- ☐ To manage the large number of gates
- ☐ To account for both of the inputs
- ☐ To hold both the result and the original number
- ☐ To hold both the result and the number that will be carried over

#5 - Code Tracing While Loops - 15pts

Given the following block of code, fill out a variable table that shows the values of the variables at the **end** of each iteration of the loop. You may not need to fill out values for every listed iteration.

```python
x = 0
y = 10
z = 0
while x <= y:
    x = x + 3
    y = y + 1
    z = (x + y) - z
    print(x, y, z)
```

	x value	y value	z value
Pre-loop	0	10	0
Iter 1			
Iter 2			
Iter 3			
Iter 4			
Iter 5			
Iter 6			
Iter 7			
Iter 8			

15-110 Check2 - Programming Portion

Each of these problems should be solved in the starter file available on the course website. Submit your code to the Gradescope assignment Check2 - Programming for autograding.

All programming problems may also be checked by running the starter file, which calls the function `testAll()` to run test cases on all programs.

#1 - `intSign(x)` - 15pts

Write a function `intSign(x)` that takes a number x as a parameter and returns a string representing its sign ("`positive`", "`negative`", or "`zero`"). You may assume x will be an int or a float.

#2 - Flow Chart to Program - 15pts

Given the control flow chart below, write a function, `mysteryFunction(a, b, c)`, that implements the control flow chart correctly.