These problems were generated by TAs and instructors in previous semesters. They may or may not match the actual difficulty of problems on Quiz2.

Booleans, Conditionals, and Errors

1. What will the following code output?

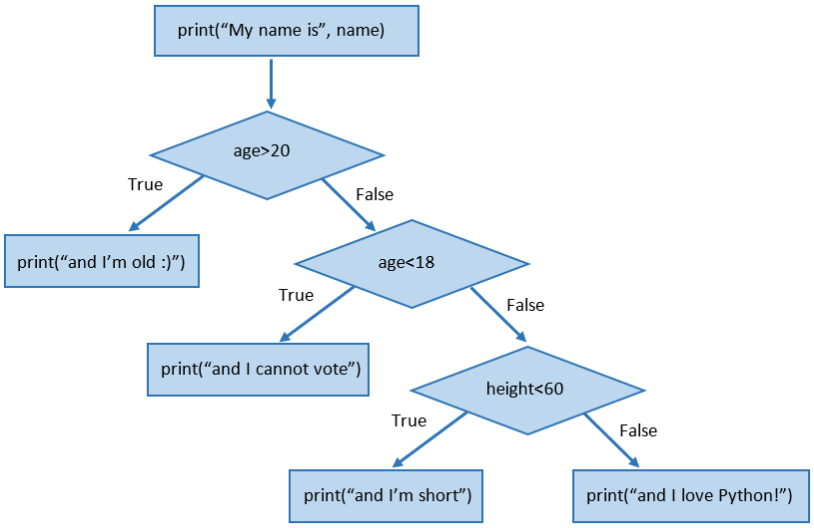
```
def f(x, y, z):
      result = ""
      if (x + y) % 2 == 0:
            result += str(x)
      if (y + z) % 2 == 1:
            result = str(y) + result
      if z % 4 == 3:
            result = ""
      return result

print(f(1, -7, 526), f(8, 43, 2), f(9, 101, 11))
```

2. Write a function `canEatIceCream(temp, hunger)` to determine whether somebody should eat ice cream on a hot day based on the integer temp (must be greater than 60 degrees) and the float hunger (must be greater than 0.5). Return the result.

3. What is the difference between the `and` vs. `or` operations in terms of their relationship with the boolean `True`?

4. Convert the following flow chart into equivalent Python code.



5. Explain the following error messages and provide one possible fix:

1)

```
Traceback (most recent call last):
  File "<tmp 1>", line 1, in <module>
    print("hello"+1)
TypeError: can only concatenate str (not "int") to str
```

2)

```
    print("name"",name)
                    ^
SyntaxError: EOL while scanning string literal
```

3)

```
def f():
    print("hello 15-110")
        return 15-110
```

```
  File "<tmp 1>", line 3
    return 15-110
    ^
IndentationError: unexpected indent
```

6. The following function takes in two numbers a and b, prints them as "a, b" and then returns their sum (for example, given a=3 and b=7 the function will print "3, 7" and it will return 10). Find the errors and classify them (into one of the three broad types of errors).

```
def printValuesReturnSum(a, b)
    print(a, b)
    return "a" +  b
```

7. The following lines of code contain multiple errors.

```
numerator = 0                # line 1
denominator = 6              # line 2
x = denominator/Numerator    # line 3
print("x', x)               # line 4
```

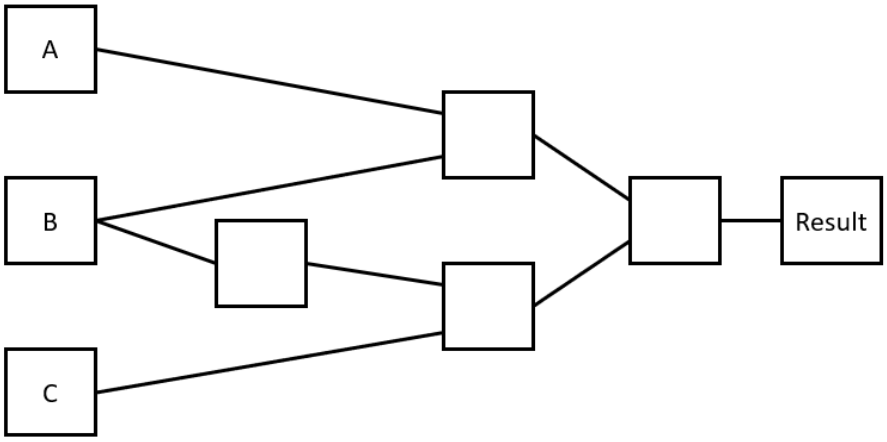
1) Find the errors and categorize them into the three general types of errors discussed in class.
2) If you run these lines of code in Pyzo, it will produce an error message. State which error in the code will cause the error message and explain your answer. In other words, which error is detected first and why? (You should be able to answer this without actually running the code)

Circuits and Gates

1. Given the following boolean expression, fill out a truth table that shows all the possible results of the expression, then label the gates on the circuit below with AND/OR/etc. so that it produces the same results.

(A or B) and ((not B) xor C)

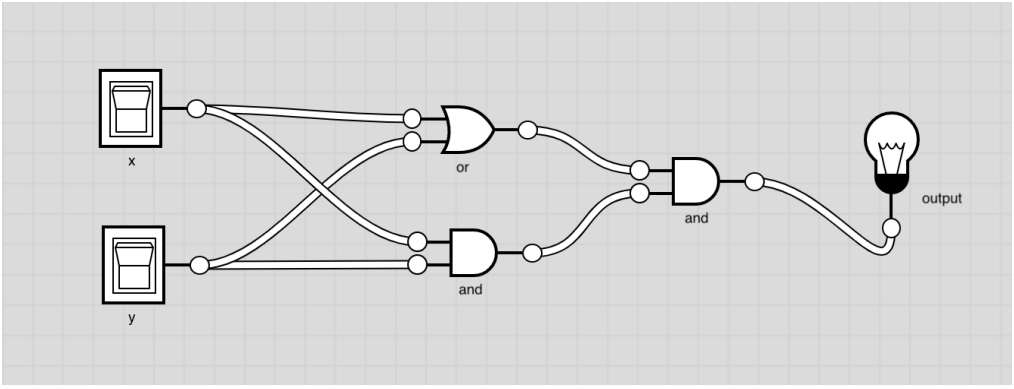
Circuit:



2. Recall that in lecture we built a simple addition machine called a Full Adder. Clearly name and describe the purpose of the input(s) and output(s) of this machine.

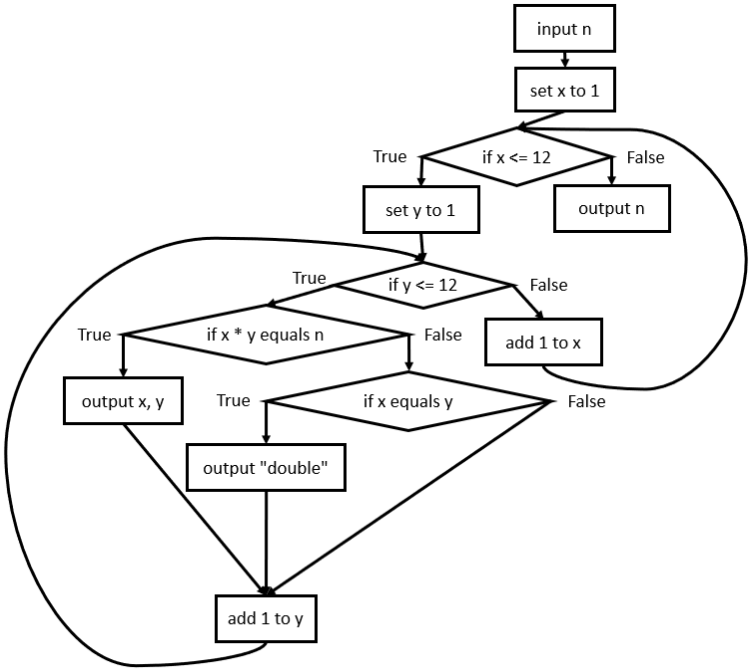
3. What is the main difference between a half adder and a full adder?

4. What boolean operation does the following logic circuit behave like?

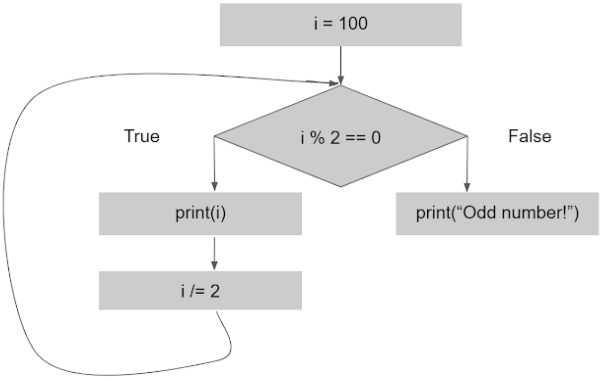


While Loops

1. Write a function `cw1(n)` that is algorithmically identical to the control flow chart shown below. The function should take an integer n as a parameter and **print** output as specified, returning nothing.



2. Write the while loop that corresponds with this flow chart.



3. Use while loop to write the function `hasConsecutiveDigits(n)` that takes in a possibly-negative int value n and returns True if that number contains two consecutive digits that are the same, and False otherwise.

4. Write the function `isPowerOfFour(n)` that takes in a number n and returns True if n is a power of 4, and returns False otherwise.

For Loops

1. Explain when you would use a while loop versus a for loop. Can you always convert a for loop to a while loop? Can you always convert a while loop to a for loop?

2. Write a function `numberOfFactors(n)` which takes in a positive integer and returns the number of factors it has.

3. Using a for loop, write the function `fizzBuzz(n)` that prints every number from 0 to n-1 inclusive. If the number is divisible by 3, print “fizz” instead of the number. If the number is divisible by 5, print “Buzz” instead of the number. If divisible by both 3 and 5, print “fizzBuzz” instead of the number.

4. Using a for loop, write the function `sumAllEven(n)` that finds the sum of all even numbers less than or equal to n.

Looping over Strings

1. Read through the following block of code, and write what it will output..

```
s = "Computer Science"
t = "GO-1-TEN"

print("A:", s[4])
print("B:", t[len(t)-2])
print("C:", s[6:12])

for i in range(2, 10, 4):
    print(s[i] + t[i])
```

2. Write a function `whileSmile(s)` that takes a string as input and uses a **while loop** to count the number of times the two-character string ":)" occurs in s. You should return the count. For example: `whileSmile("Hello :):):)")` should return 3.

3. Write a function `reverseString(s)` that returns a reversed version of the string s.