15-110 Practice Exam 1

Show work when needed, it can be used for partial credit! Also note that these questions are a rough estimate and are compiled by TA's who have not seen the exam. Topics covered in class are fair game even if they are not on this exam.

Short Answer/Multiple Choice/Fill in the blank:

1. What is the smallest SIGNED integer that can be represented with 1 byte's worth of bits?
   -128

2. State if there is an error in each of the following blocks of code. If an error is found please specify the type. Otherwise write "No error"

```
num = 12
if num % 2 == 0:
        print("divisible by 3")
if num % 3 == 0:
        print("divisible by 3")
```

   Logical error

```
x = 5
while x > 0:
        print("Nonzero")
        x -= 1
print("x = " + x)
```

   Runtime error

```
num  = 20
total=1
for i in range ( num):
        print(  str(num) +"!")
        total *= num
total =int("21")
print   (total)
```

   No error

```
x = 5
y = 2
if x == 5:
        y -= 2
        print("y is equal to 0")
if y == 0:
        print(x / y)
else:
        print(x is equal to " + str(x))
```

Syntax error (they always occur before runtime!)

3. What is the purpose of c_in and c_out in a full adder?

   To carry a value while adding multi digit numbers.

4. What would you use to sum two numbers that are greater than 1?

   N-bit adder

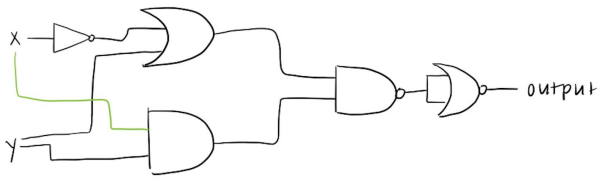
5. What would you use to save the state of a bit?

   Flip flop

6. Convert 53 to binary using 10 bits
   0000110101

7. What is 1110 + 0101 (binary)?
   10011 (19)

8. What boolean operation is this equivalent to?



   And gate

Code Tracing: Provide the outputs from the given functions

9.
```
def ct(s, n):
        result = ''
        if len(s) % n == 0:
            result += s[:n]
        elif len(s) // n == 1:
            result += s[n:]
        else:
            return None
        return result

print(ct('Apple', 2))
print(ct('Pear', 4))
print(ct('Orange', 3))
```

None
Pear
Ora

10.
```
def f(x, y, z):
        result = ‘’
        if (x+y)%3 == 1:
            result += str(x)
        if (y+z)%2 == 0:
            result = str(y) + result
        if z%2 == 1:
            result = result + str(z)
        return result
print( f(3,4,8), f(1,3,3))
```

43 313

11.
```
def ct2(x, y):
        Result = 0
        for z in range (x,y):
            if (z%2==1):
                print (z, result)
                result += z%10
        return result
 print(ct2(20, 30))
```

21 0
23 1
25 4

27 9
29 16

Free Response:

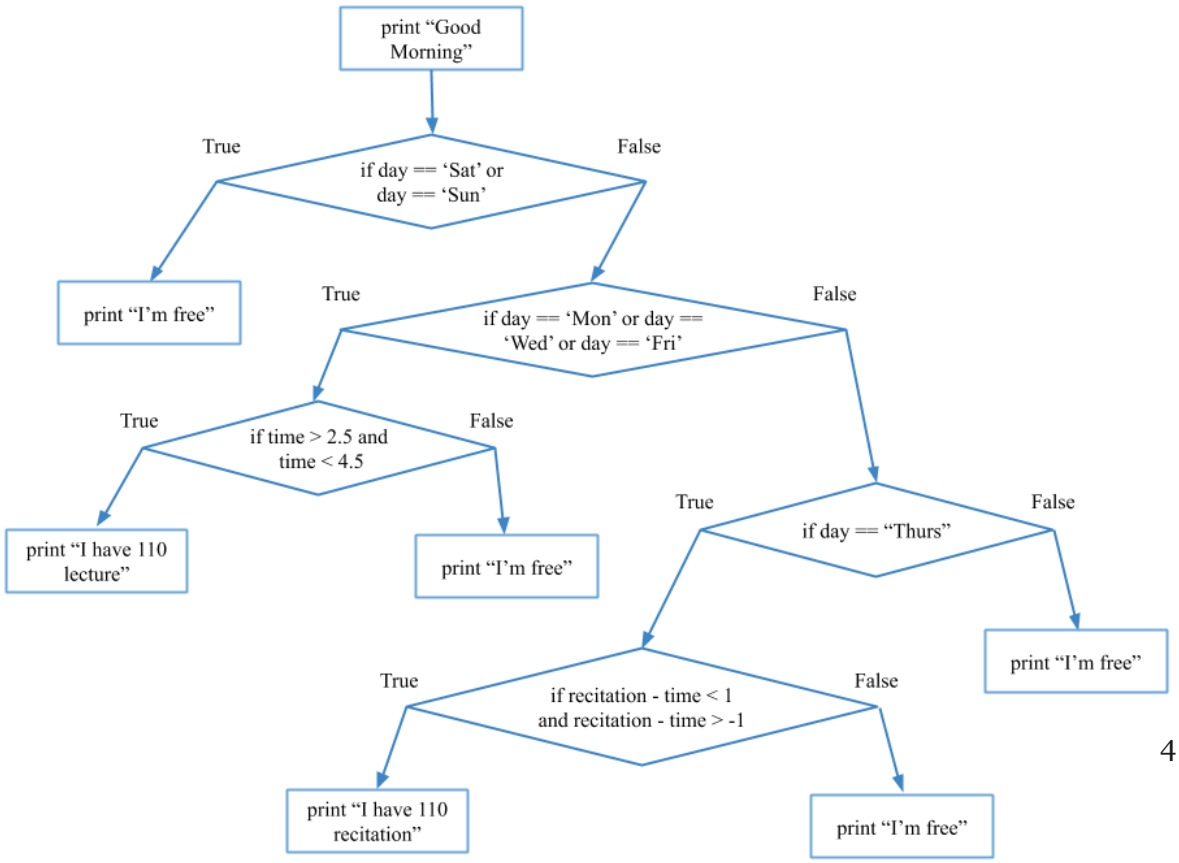
12. Write a function hello that takes in an integer x and prints "Hello" x times if x is not a multiple of 3. Return true if the function printed "Hello" and false otherwise.

```
def hello(x):
    if x % 3 != 0:
        for i in range(x):
            print("Hello")
        return True
    return False
```

13. Write a function stringSum that takes in a string containing numbers separated by "+" characters and return the integer sum of these numbers.

```
def stringSum(s):
    sum = 0
    for i in s.split("+"):
        sum += int(i)
    return sum
```

14. Convert the following flowchart into the function scheduler, which takes as input the variables day, time, and recitation.



```
def scheduler(day, time, recitation):
    print("Good morning")
    if day == "Sat" or day == "Sun":
        print("I'm free")
    elif day == "Mon" or day == "Wed" or day == "Fri":
        if time > 2.5 and time < 4.5:
            print("I have 110 lecture")
        else:
            print("I'm free")
    elif day == "Thurs":
        if recitation - time < 1 and recitation - time >-1:
            print("I have 110 recitation")
        else:
            print("I'm free")
    else:
        print("I'm free")
```