CSC 110 EXAM 1 REVIEW GUIDE

TOPIC LIST:

1. Python Basics and Computers
2. Strings, Printing, Multiplication, Input
3. Mathematics in Python
4. if-statements
5. while-loops
6. Binary
7. Functions
8. String Indexing and Slicing
9. Scope
10. Anything covered in class, the PAs, or the readings up until the exam

STUDY RESOURCES:

- Slides
- The book
- Prep problems
- videos
- This study guide

QUESTIONS?

- Office Hours
- Discord
- Email

REVIEW PROBLEMS:

Note: these are not the exact questions that will be on your test. These questions were written collectively by Section Leaders. Feel free to jump questions, and do the ones you think will help you the most.

1) Convert from Decimal to Binary:
   a) 6
   b) 42
   c) 77
   d) 128

2) Convert from Binary to Decimal:
   a) 0001 0010
   b) 0011 0101
   c) 1011 0100
   d) 0101 1011

3) Calculate the value and the type for the following expressions:
   a) `11 + 4.2 // 2 * 9`
   b) `(((13 + 5) * 2 ) - 4) / 2) - 13`
   c) `(((13 + 5) * 2 ) - 4) // 2) - 13`
   d) `99 % 10 / 3 * 8`
   e) `100 - 25 * 3 % 4`
   f) `100 - 25 * (3 % 4)`
   g) `9 % 3 * 4 / 9`
   h) `1 + 3 * 2 // 4`
   i) `5 * 2 + int( 20 % 7 / 3 ) // 2`
   j) `((4 + 5) * (3 + (7 % 2)) - (40 / 2)) * 2`

4) What will be the <u>value of the variable z</u> at the end of these lines of code?

```
x = 27
y = x + x * 2
y += 4
z = x < 27 and y == 81
```

5) Evaluate the following:

```
a) 25 / 5 == 5
b) 10 // 3 == 23 // 8 + 1
c) 'a' < 'c' or 'b' < 'a'
d) 5 < 6 - 1 and 9 > 3
e) 7 + 2 == 9 and 'hello' < 'world'
```

6) For each of the expressions below answer if the result will be True or False.

```
a) False or (True and True)
b) True and True and (False or False) or False
c) not False and (not False or False)
```

7) What is wrong with the following segment of code? There are multiple errors.

```
index = 0
while index < 10:
     print("Index during this loop: " + index)
```

8) Fix the error in the following code:

```
print('Bob's car is bright red. You can't miss it.')
```
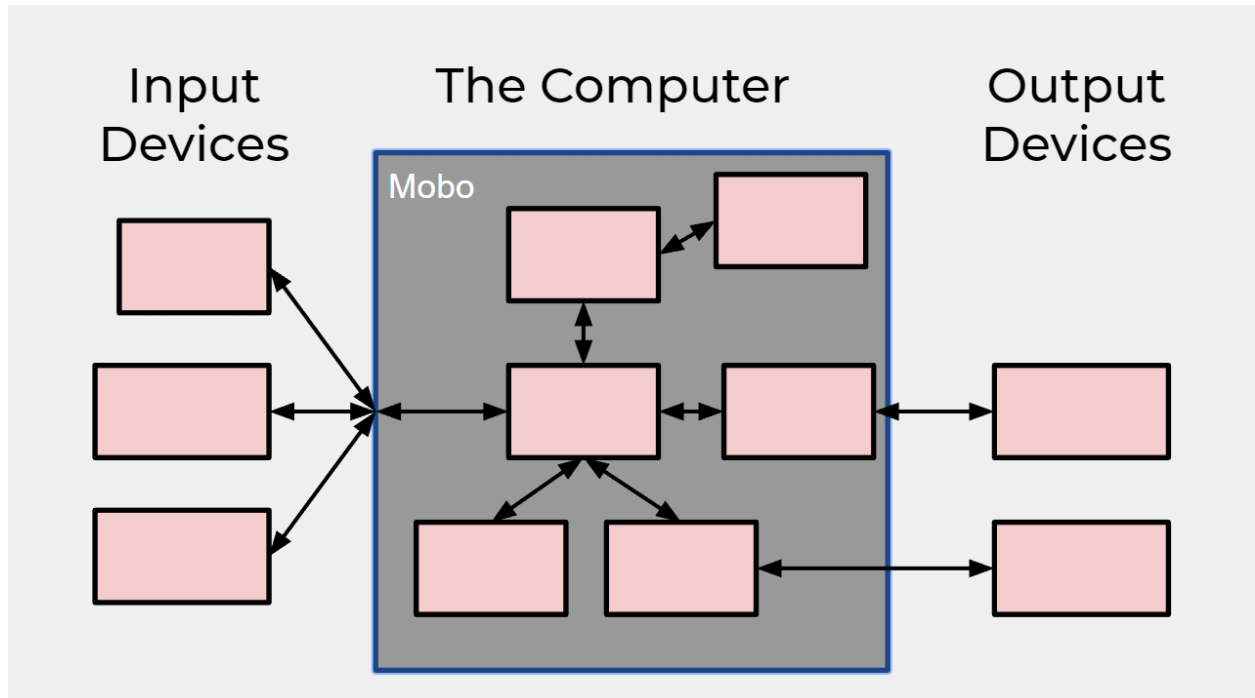
9) What is the output of the following code:

```
elephants = "peanuts"

monkeys = "bananas"

penguins = "fish"

fish = "algae"

algae = "photosynthesize"

peanuts = "charlie brown"


print("elephants", "like to eat", peanuts)

print("monkeys like to eat", penguins * 2)

print(fish, "like to eat", monkeys, "and", "peanuts")
```

```
print("fish", "like to eat", elephants, "and", penguins, "that",
algae)
```

10) Given the diagram of a computer bellow, fill in the empty squares with the appropriate
parts of the computer.

11) Consider the following code:
```
if spiderman:
    if batman:
        print("false")
    else:
        print("true")
elif batman:
    if spiderman:
        print("false")
    else:
        print("true")
else:
    print("false")
```

What will the output of the code be if:...

   a) `batman = False and spiderman = False`

   b) `batman = True and spiderman = False`

   c) `batman = False and spiderman = True`

   d) `batman = True and spiderman = True`

12) Draw a CFG diagram with the following code:

```
grade = input("What percentage grade did you get in CSc110? ")

while(grade.isnumeric() != True or int(grade) < 0 or int(grade) >
100):
    print("Enter a valid percent!")
    grade = input("What percent did you get in CSc110? ")

grade = int(grade)

if (grade >= 90):
    print("You got an A!")
elif (grade >= 80):
    print("You got a B!")
elif (grade >= 70):
    print("You got a C!")
elif (grade >= 60):
    print("You got a D!")
else:
    print("You got a E!")
```

13) What is the output of the following code:

```
num = 0
while False:
    num = num + 3
    print("Hello again")
```

14) What is the output of the following code:

```
str1 = "Hello World"
index = len(str1)
while index > 0:
    print(str1[index-1 : index])
    index -= 1
```

15) What will be the output for the following print statements? If an error occurs then just write error for the answer.

```
a) my_var = "110"
   print("Computer science" + " class " + my_var + " is the" +
       " best")
b) my_num = "5"
   print("Hello Number" * my_num)
c) print("Hello " * 3, end="")
d) print(("Hello" + "world" * 3 + "\n") * 5, end="42")
```

16) What will the output of the following code be?

```
start = 0

if not start != 0:
    start += 13
    if start > 3 and (True or False):
        start -= 5

    if start >= 6 or not start < 9:
        start *= 5

    elif start == 13:
        start += 10

    start = start - 40

else:
    start = 25

    if not start == 25 or not False:
        start = 35

    else:
        start = 40

print(start)
```

17) What is the output of the below code for the following inputs:

```
catch_phrase = input("Please enter a catch phrase")
```

```
if(catch_phrase == "Wubba lubba dub dub"):
    print("Rick and Morty")
elif(catch_phrase == "17"):
    print("I am 16 going on 17")
elif(catch_phrase == "You're my only hope"):
    print("Obi-wan Kenobi" + catch_phrase)
elif(catch_phrase == "you killed kenny!"):
    print("South Park")
elif(catch_phrase == "winter is coming"):
    print(catch_phrase, " : winter is here")
else:
    print("party wolf ooooo")
```

a) zzz
b) You're my only hope
c) Wubba lubba dub dub
d) 16
e) winter is coming
f) yellow submarine

18) Write out the output for both of the following snippets of code. Are they different? Why or why not?

```
my_value = 42

if (my_value < 100):
    print("Less than 100.")
if (my_value > 28):
    print("Greater than 28.")
if (my_value == 42):
    print("My value is 42.")
```

```
my_value = 42

if (my_value < 100):
    print("Less than 100.")
elif (my_value > 28):
    print("Greater than 28.")
elif (my_value == 42):
    print("My value is 42.")
```

19) What is the output of the following code given the input of "19"? How many times is the loop condition checked?

```
number = int(input("Please enter a number: "))

if number < 19.01:
        print("May ", end = "")
        if number > 22:
                print("The ", end="")
        else:
                print("Your ", end="")

print("Heart ", end="")

if type(number) == str:
        print("Force ", end="")
else:
        print("Be ", end="")
        print("Your ", end="")

i = 0

while i < 2:
        if i % 2 == 0:
                print("Guiding ", end="")
                i += 1
        elif i % 2 == 1:
                print("Key")

        if i % 3 == 0:
                print("Be With You")
        i += 1

print("<#")
```

20) Will this code ever exit?

```
i = 0
while i < 10:
        i + 1
print(i)
```

21) What is the output of the following code in each iteration?

```
i = 10
a = 1
b = 0

while i >= 0:
    if a >= b and a + b < i:
        a = a + 3
        i = i - a + b
    else:
        a = a + 1

    a = a + 2
    b = b + 3
    i = i - 1

    print(a, b)
```

22) Write a function `total_volume` that takes in a user's input of width, length, height, and the units that will output the user's total volume. Your function should first make sure that the user inputs are non negative.

Example (user input is given in red):

```
Please input a width: 3
Please input a length: 3
Please input a height: 3
Please input the units: in

The volume of the object is 27 in^3
```

23) Write a function `study_calculator` that can be used to calculate the user's total hour of studying in n weeks. First, you need to ask the user how many weeks he/she wants to calculate (asking the value of n), then you need to write a `while loop` that ask the user how many hours they spent on studying for this week nth time, and you need to find out the total amount of hours they spent on studying for n weeks.

Example:

```
How many weeks do you want to calculate? 3
How many hours did you spend on study for this week? 20
How many hours did you spend on study for this week? 30
```

```
How many hours did you spend on study for this week? 30
You spent 80 hours on studying in total.
```

24) Write a **SINGLE** print statement that prints out the following:

```
//\\
\\//
```

(hint: you will need to use a newline character)

25) Write the code that will generate this output using only while loops and if statements (no string multiplication).

```
###AAAAAAAA###
###BBBBBBBB###
###CCCCCCCC###
###AAAAAAAA###
###BBBBBBBB###
###CCCCCCCC###
```

26) Write code that asks the user for a size and prints a triangle of stars of that size that increases by one at each level. You can only use one while loop and any number of variables and counters you want, but you are limited to these tools.

Example (user input is given in red):

```
Size? 5
*
**
***
****
*****
```

27) Write a block of code that prints out a box, that takes in three inputs: a width, a height, and a fill-character.

This code will print a box outlined with the $ character, and should be filled with the fill character, width many times per row, and there should be height many rows of the fill character.

Note - String-multiplication should be used, no while loops should be used. You may assume proper input is given (an integer is given for the height, width, and a fill is only one character wide).

Example (user input is given in red):

```
Enter the width: 5
Enter the height: 3
What would you like to fill with? ^
$$$$$$$
$^^^^^$
$^^^^^$
$^^^^^$
$$$$$$$

Enter the width: 3
Enter the height: 5
What would you like to fill with? %
$$$$$
$%%%$
$%%%$
$%%%$
$%%%$
$%%%$
$$$$$
```

28) Which of the following code snippets will output something different than the others?
What could you change about that code to make it match the other two?

```
a) print("hello" * 3)
b) i = 0
   while i < 3:
        print("hello")
        i += 1
c) print("hellohellohello")
```

29) For the following while loop, determine what the output is when end_val is:
   a) 5
   b) 10
   c) 11

```
index = 0
end_val = int(input("Enter number for end_val: "))
end_str = ""
while index < end_val:
    if index % 2 == 1:
```

```
        end_str += "o"
        index += 2
    else:
        end_str+= "e"
        index += 2
    index += 1
print(end_str)
```

30) Write a function `calculations` that calculates a basic operation between two numbers. You will need to take 3 inputs from the user: the first number, a math operator and the second number. The math operator input should be one of these four: '+', '-', '/' or '*'. If it is anything else, it should print "invalid operator". The output should be addition, subtraction, multiplication or division of the numbers given based on the operator.

Example:

```
Number 1: 10
Operator(+, -, / or *): +
Number 2: 35
45
```

31) Using the code below, determine what the output would be for each input:

```
name = input("Enter your name: ")

if name > "nathon":
        if name < "aaron":
                print("green")
        elif name < "sophia":
                print("blue")
        else:
                print("yellow")

else:
        if name < "connor":
                print("orange")
        if name > "daniel":
                print("red")
```

   a) victor
   b) dylan
   c) kate

32) Are there any inputs in the question above that won't print out anything? Are there any outputs that cannot be reached?

33) What is the output of the following program?

```
def fun1():
     print("All you need is love")

def fun2():
     print("love, love is all you need")

def main():
     num = 0
     while num < 3:
          fun1()
          num += 1
     fun2()

main()
```

34) Answer the following questions based on the code below:

```
def dogs():
    dog_age = int(input('How old is your dog? '))

    if dog_age >= 0 and dog_age <= 1:
        print('Your dog is a puppy!')
    elif dog_age > 1 and dog_age < 10:
        print('Your dog is still a puppy! All dogs are puppies!')
    else:
        print("Unless your dog is a senior, then it's a senior
dog.")
    if dog_age < 0 and dog_age > 5:
        print("All dogs are good dogs.")
    if dog_age < 0 or dog_age > 20:
        print("Are you sure you have a dog?")

dogs()
```

   a) What would this program print if the user input 1?
   b) What would this program print if the user input 4?
   c) What would this program print if the user input -2?
   d) Is it possible for the program to print every print statement?

35) Using the following code, determine what will print out when the function `print_mystery()` is called.

```
def print_mystery():
    x = 3
    y = x * 2
    while y >= 2:
        if y % 2 == 0:
            y -= x
        else:
            y -= 1
    print(y)

print_mystery()
```

36) Given this code:

```
def squared():
    power = 2
    return val ** power

val = int(input('Enter a number: '))
val_squared = squared()
print(str(val) + ' squared is ' + str(val_squared))
```

   a) What is the output when the user inputs 5?
   b) How many global variables?
   c) How many local variables?

37) Find the output for the following code:

```
def calculate(n, other):
    if n < other:
        n += 3
        other -= 4
    if other < n:
        n -= 2
        other = n * 2
    else:
```

```
        other -= 1
    print(n, other)
```

a) calculate(6, 3)

b) calculate(17, 19)

c) calculate(4, 4)

d) calculate(36, 2)

EXAM 1 REVIEW GUIDE ANSWER KEY

1)
        a) 110
        b) 101010
        c) 1001101
        d) 10000000

2)

    a) 18
    b) 53
    c) 180
    d) 91

3)

    a) 29.0
    b) 3.0
    c) 3
    d) 24.0
    e) 97
    f) 25
    g) 0.0
    h) 2
    i) 11
    j) 32.0

4) False

5)

    a) True
    b) True
    c) True
    d) False
    e) True

6)

    a) True
    b) False
    c) True

7)

Index variable doesn't get incremented, so the loop will run forever. Another issue is it tries to concatenate a string and an integer which you can't do.
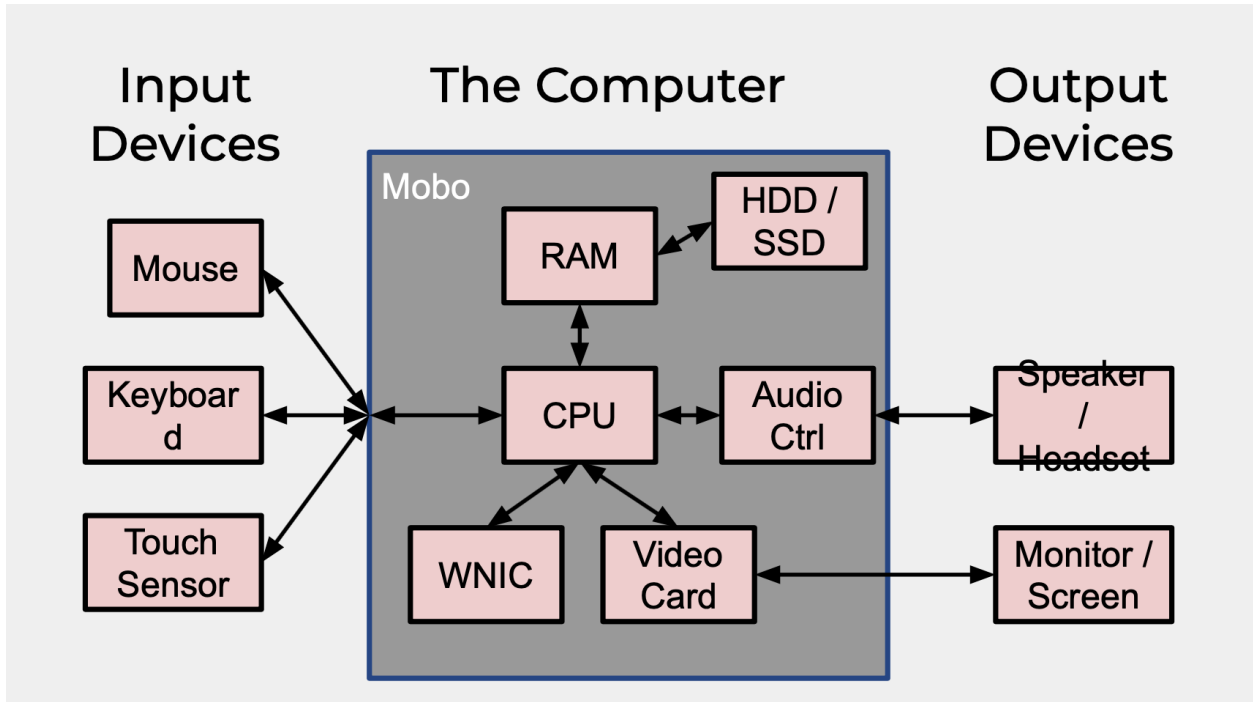
8)

One way to fix the problem is to switch the single quotes at the beginning and end to double quotes. Another option would be to escape the single quote characters you want to show up using the \ key.

9)

elephants like to eat charlie brown
monkeys like to eat fishfish
algae like to eat bananas and peanuts
fish like to eat peanuts and fish that photosynthesize

10)

Input Devices | The Computer | Output Devices

Mobo
Mouse
Keyboard
Touch Sensor
RAM
HDD / SSD
CPU
Audio Ctrl
WNIC
Video Card
Speaker / Headset
Monitor / Screen

11)

    a) false
    b) true
    c) true
    d) false

12) TODO, NOT SURE WHAT ANSWER IS

13)

There is no output. The condition for the while loop is False, which means it will never go inside of the loop.

14)

d
l
r
o
w

o
l

l
e
h

15)

a) Computer science class 110 is the best
b) Error, you can't multiply a string by another string.
c) Hello Hello Hello
d) Helloworldworldworld
   Helloworldworldworld
   Helloworldworldworld
   Helloworldworldworld
   Helloworldworldworld
   42

16) 0

17)

a) party wolf ooooo
b) Obi-wan KenobiYou're my only hope
c) Rick and Morty
d) party wolf ooooo
e) winter is coming : winter is here
f) party wolf ooooo

18)

Yes, the output will be different. Since the top half uses all if statements, every if statement will be checked regardless of if you go inside one if statement. The bottom half uses if/elif statements, which means that at most you will only go into one of those if/elif statements.

TOP HALF OUTPUT:
Less than 100.
Greater than 28.
My value is 42.

BOTTOM HALF OUTPUT:
Less than 100.

19)

Output:
May Your Heart Be Your Guiding <#

The loop condition will be checked 2 times total.

20)

No, i is not being incremented correctly and so the loop will never end.

21)

```
6 3
9 6
12 9
15 12
18 15
21 18
24 21
```

22) ONE POSSIBLE SOLUTION

```python
def total_volume():
    width = int(input("Please input a width: "))
    length = int(input("Please input a length: "))
    height = int(input("Please input a height: "))
    units = input("Please input the units: ")

    if width < 0 or length < 0 or height < 0:
        print("Sorry, none of the numbers can be negative")
    else:
        volume = width * length * height
        print("The volume of the object is", volume, units + "^3")
```

23) ONE POSSIBLE SOLUTION

```python
def study_calculator():
    weeks = int(input("How many weeks do you want to calculate? "))
    i = 0
    total_hours = 0
    while i < weeks:
        hours = int(input("How many hours did you spend on study for this week? "))
        total_hours += hours
        i += 1
    print("You spent", total_hours, "hours on studying in total.")
```

24) ONE POSSIBLE SOLUTION

```python
print("//\\\\\n\\\\//")
```

25) ONE POSSIBLE SOLUTION

```python
i = 0
while i < 6:
    if i % 3 == 0:
        print("###AAAAAAAA###")
    elif i % 3 == 1:
        print("###BBBBBBBB###")
    elif i % 3 == 2:
        print("###CCCCCCCC###")
    i += 1
```

26) ONE POSSIBLE SOLUTION

```python
size = int(input("Size? "))
i = 0
stars = '*'
while i < size:
    print(stars)
    stars = stars + '*'
    i = i + 1
```

27) garrett is working on this problem

28) b is different from others.
   You can change the print to this: print("hello", end ="")

29) a: eo b: eoeo c: eoeo

30) ONE POSSIBLE SOLUTION

number_1 = int(intput("Number 1: "))
operator   = input("Operator(+, -, * or /): ")
number_2 = int(intput("Number 2: "))
if operator == "+":
        print (number_1 + number_2)
elif operator == "-":
        print (number_1 - number_2)
elif operator == "*":
        print (number_1 * number_2)
elif operator == "/":
        print (number_1 / number_2)
else:
        print ("invalid operator")

31) a: yellow b: red c: red

32)
The code is unable to print green as "nathon" is greater than "aaron" so nothing can be greater than "nathon" and less than "aaron".

If the user would put in "daniel" as the input, nothing would be printed. This is because there is no else inside the block so "daniel" fails to enter either if.

33)
All you need is love
All you need is love
All you need is love
love, love is all you need

34)
   a) Your dog is a puppy!
   b) Your dog is still a puppy! All dogs are puppies!
   c) Unless your dog is a senior, then it's a senior dog.
      Are you sure you have a dog?
   d) No, there is no number that can be both < 0 and > 5.

35) -1

36)
   a) 5 squared is 25

   b) Two global variables, val and val_squared

   c) One local variable

37)
   a) 4 8
   b) 18 36
   c) 4 3
   d) 34 68