CSC 120.0003 Midterm Exam – Benjamin Steele

**1 Number Systems and Digital Logic**

1. Convert the following to bytes
   1. 1024 bits – 128 bytes
   2. 2048 bits – 256 bytes
   3. 4096 bits – 512 bytes
   4. 8192 bits – 1024 bytes
   5. 16384 bits – 2048 bytes
2. What is the MSB and LSB of the following:
   1. 100000
      1. MSB – 1
      2. LSB – 0
   2. 11101010
      1. MSB – 1
      2. LSB – 0
3. NAND Operations
   1. 11101 NAND 10101 = 01010
   2. 10111 NAND 00101 = 11010

Computer Science: An Overview, 13th Edition, Chapter 1.1

1. XOR Operations
   1. 11101 XOR 10101 = 01000
   2. 10111 XOR 00101 = 10010

Computer Science: An Overview, 13th Edition, Chapter 2.4

1. Using 11110000 as a bitmask in an AND operation will cause the original number (that the mask is being applied to) to maintain its first four binary digits and then flip the remaining four to 0. ANDing all 1s to a different number will not change the result of those numbers, but, ANDing all 0s to a different number will change the result of those numbers to 0s.

Examples:

* 1. 101001101 AND 11110000 = 10100000
  2. 00101001 AND 11110000 = 00100000
  3. 11101111 AND 11110000 = 11100000

Computer Science: An Overview, 13th Edition, Chapter 2.4

1. Hexadecimal to binary
   1. 0x3A21 = 11101000100001
   2. 0x11F0 = 1000111110000
2. Hexadecimal to decimal
   1. 0xFA = 250
   2. 0x10 = 16
3. Decimal to hexadecimal
   1. 103 = 0x67
   2. 210 = 0xD2

**2 Programming Questions**

<https://colab.research.google.com/drive/1jGtWCP4SAvQsxl67s3NWokS2fNB2-Dp_?usp=sharing>

# Programming Question 1

# Find Most Significant Bit

myList = []

print("This application will display the Most Significant Bit in a string of binary digits")

binaryDigits = input("Please enter any string of binary digits: ")

for i in binaryDigits:

myList.append(i)

print("The Most Significant Bit is",myList[0])

<https://www.geeksforgeeks.org/isupper-islower-lower-upper-python-applications/>

# Programming Question 2

# Determine if username is valid or invalid

uName = input("Please enter a username: ")

if len(uName) <= 6:

print("Invalid username. The length should be greater than 6 characters")

elif not uName.islower():

print("Invalid username. Uppercase character found")

else:

print("Valid username")

1. When running the code without indentation, and indentation error is received because Python is expecting an indented command after the for loop statement, as well as after the if statement. Indenting the if statement and double indenting the print statement resolves the issue and provides the correct output of 8 and 9.

# Programming Question 3

# Correct the indentation

i=7

for j in range(1,10):

if j>i:

print(j)

# Programming Question 4

# List of powers of 2 from 0 to 20

powersList = []

for i in range(0,21):

powersList.append(2\*\*i)

print(powersList)

# Programming Question 5

for i in range (10,50,4):

print(i\*i)

# The 10 represents the starting value of the iteration

# The 50 represents the final value of iteration

# The 4 represents the increment at which the iteration occurs

# The program will first print the result of 10x10, then 14x14, 18x18,

# and so on adding four to the operators each time until 46x46

# Programming Question 6

# The following code first prints the remainder of the division of 87 and 7,

# because the modulus operator, %, finds the remainder, not the quotient.

# Then, it prints the result, or quotient, of dividing 87 and 7 because the

# division operator, /, finds the quotient, not the remainder.

a = 87

b = a%7

print(b)

c = a/7

print(c)

**3 Computer Organization**

1. 16
2. 256
3. 2 bytes
4. 4 bits for the opcode and 12 bits for the operand
5. The instruction 0x15B3 would cause the contents of the memory cell located at address 0xB3 to be placed in register 0x5, so the decimal value of 12 would be placed in the CPU register 0x5.
6. The instruction 0x25C3 would cause the value 0xC3 to be placed in register 0x5, so the decimal value of 195 would be placed in the CPU register 0x5.
7. The instruction 0x71B2 would cause the result of ORing the contents of register 0xB and 0x2 to be placed in register 0x1.

Computer Science: An Overview, 13th Edition, Appendix C

**4 General Awareness**

I don’t believe I am currently following any of the official ergonomic guidelines. I typically sit cross-legged on my couch with my laptop on my lap. Perhaps the only guidelines I am vaguely following are that my wrists aren’t resting on the laptop while I type, my screen is below my eye level, my laptop is on/above my lap, and I normally keep my blinds closed. When my legs fall asleep, I usually stretch them out and rest them on an ottoman. At some point in the future, I would like to get a desk and chair that I could use for work and school, but I don’t foresee that happening in the next few weeks.

**5 Extra Credit**

1. At the start of this course my programming ability was probably around a 2. I write simple batch and PowerShell scripts but have not used much of any other language. Since then, I have learned a lot about programming basics and how to utilize them in Python between this and my Web, Programming, and Database Foundations classes. I may be near a 5 at this point because of being able to gain a better understanding of some fundamental topics, but I am sure there is a long way to go before I can write some more complex programs with GUIs. One of the challenges I *think* I’ve overcome is nested loops. This was difficult for me to fully grasp but I believe I have made significant improvements.
2. Some of the labs were more difficult than others. I had a lot of trouble with Lab 05, specifically the loops. Other times I haven’t always been clear on what the expected output should be if it’s not specifically written out (Lab 03, Section C, Number 2), or whether we can/should be importing certain libraries to complete the problems. Otherwise, they have been a challenge for me with the little programming background I have, but I was able to tackle them. As long as we have the necessary info in the teaching modules and/or hints for where to research it I’m fine with more challenge, I just need to know what I have to learn/use to apply the topics.
3. I’m looking forward to getting a refresher on networking, and then, learning more about database foundations as I have less experience in this topic.