New York University

CSC-101 Intro To Programming Language

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Class Problem Set 1: Midterm Materials

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Instructions

Unless stated otherwise assume you cannot access any additional materials or resources. You cannot use any IDE or programming environments such as VS Code. You may write your code using pen and paper, word processor such as MS Word, or plain text editor such as NotePad.

Console IO, Variable, and Data Types

1. Define a programming variable.
2. State the primitive data types in Python and give examples for each.
3. Is 2 and 2.0 the same datatype? Use the appropriate in-built function to justify your answer.
4. What is the datatype of the value returned by the input() function in Python?
5. Write a Python program that takes any arbitrary string from the user and stores it in a variable. Furthermore, the program asks for a positive integer N from the user. Then the program creates N duplicates of the string. For example, if the user gives the string "Alice" and integer 5, the output would be: "AliceAliceAliceAliceAlice".

Operators

1. Predict the outputs unless there are error in the given code. If there are errors identify the lines of the code that will raise errors:
   (a) 1. num=2
   2. num+=1
   3. print(num)

   (b) 1.num1=bin(16)
   2. num2=bin(15)
   3. print(bin(num1&num2)

   (c) 1. print(True==False)

   (d) 1. print(10^3)
2. List all the bitwise operators; and give example of their usage.
3. Write a program that asks the user to input an integer. You should use the prompt,"Please enter an integer: ". Return to the user the binary representation of the integer. Can you explain what happens when N is a negative number.

Conditional Statements

1. Write a program that asks, "Please state if you are a freshman, sophomore, junior or senior: ". If the user enters freshmen output, "You will live in Brittany Hall". If the user enters, sophomore the program informs them that, "You can select any hall aside from Brittany Hall". For junior, " As a junior you may make your own lodging arrangements. To do so please contact Housing no later than June 15th. Otherwise, you can select any hall aside from Brittany Hall. For seniors, " As a senior you may live outside school's residential halls. If you wish to do so contact housing no later than June 15th. Otherwise, you can select any hall aside from Brittany Hall. You will receive priority for 7th Street."
2. Write a program that asks the user to input an integer. If the integer is an even number, output "*user's input* is an even number". Otherwise, output "*user's input* is an odd number".

Loops

1. Use **nested** loops to print out the following pattern of * based on a positive integer, N the user will give in through the console: For N=5, the pattern is
   1. *
   2. **
   3. ***
   4. ****
   5. *****
2. Solve the previous question using only one loop.
3. Do the question above but the pattern is inverted. So for N=5 you will get:
   1.*****
   2.****
   3.***
   4.**
   5.*
4. Write a program that takes a positive integer, N, from the user. It then returns the sum: $1^2+2^2+3^2+\ldots+N$ using a **loop**. For example for $N = 3$,the sum is 14.
5. Write a program that accepts two numbers, *base*, and, *power*, and computes $base^{power}$. $Base$ can be any real number, while *power* has to be an integer.
6. Write a program that accepts two positive integers, a, and b from the user. The program must output all the common divisors of a and b.
7. Write a program that take a positive integer, n, from the user and outputs $n!$.