

Data Science Workshop-1 (CSE 2195)

ASSIGNMENT-1: VARIABLES, OPERATORS, FUNCTIONS, CONTROL STRUCTURES AND STRINGS

1. Write a Python script to show the output as
 - a. "The elevator to 'success' is out of order, You'll have to use the "stairs", one step at a time."
 - b. 'Do what you can, \\with what you have, \\nwhere you are.'
2. Find the outputs for the following scripts.
 - a. 8 and 4
 - b. not 6
 - c. 0 or 1
 - d. 1 or 0
 - e. $-6*25+9/3*2+65$
 - f. $5\%10 + 2 * 3 ** 2 // 4 - 5$
 - g. 'hello'*(5-2)
 - h. 'hi' > 'how' or 'bye' < 'Bye'
 - i. $10 != 9$ and $29 >= 29$ and 'hi' > 'hello' or 'bye' < 'Bye' and $7 <= 2.5$
3. Differentiate between the following and give examples:
 - a. = and ==
 - b. // and %
 - c. Partition() and Split()
 - d. * and **
 - e. $x=x*10$ and $x*=x*10$
 - f. Interpreted language and Compiled language
 - g. Data scientist and Data Analyst
 - h. \ and /
 - i. lstrip() and rstrip()
4. Construct logical expressions for representing the following conditions:
 - a. marks scored should be greater than 300 and less than 400.
 - b. Whether the value of grade is an uppercase letter.
 - c. The post is engineer and experience is more than four years.
5. Create a program that reads length and breadth in yards of a soccer field. How many acres does it cover? (Note: 1 yard = 3 feet)
6. A bakery sells cupcakes for 60 Rs each and loaves of bread for 80 Rs each. Write a program that takes input from the user for the number of cupcakes and loaves of bread, then computes the total cost.
7. A skydiver jumps from an altitude of 1,000 meters. Write a program to Compute their speed when they reach 200 meters above the ground, assuming an initial speed of 0 m/s. Assume that the constant acceleration is $9.8m/s^2$. You can use the formula $v_f = \sqrt{(v_i^2 + 2ad)}$ to compute the final speed, v_f , when the initial speed, v_i , acceleration, a, and distance, d, are known.
8. Write a program that reads a four-digit integer from the user and displays the sum of its digits. For example, if the user enters 2112 then your program should display $2 + 1 + 1 + 2 = 6$.

9. Write Python statements for the following equations:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

and

$$y + x^2 - 7$$

10. Write a program that accepts the duration in days, hours, and minutes from user. Compute the total duration in days and display it as a decimal value.(Hint:1 year-365 days.There are 24 hours and 60 minutes in a day.For days- If user input 23, it means date is 23rd of that month.)
11. Create a program that prompts the user for the radius of a cone, r, and its height, h. Compute and display the volume and slant height using the formula volume = $\frac{1}{3} * \pi * r^2 * h$ and $\sqrt{r^2 + h^2}$ respectively.
12. Find the output and describe the method that is used in the question.
Let the string str is given by-

str= Hey! Hello!, The ones who are crazy enough to think, they can change the world! are the ones who do.
can you tell me, this was told by Mr.who?

- a. len(str)
- b. str.upper()
- c. str.lower()
- d. str.title()
- e. str.capitalize()
- f. str.swapcase()
- g. str.split(',')
- h. str.find('who')
- i. str.rfind('who')
- j. str.find('who',50,120)
- k. str.istitle()
- l. str.islower()
- i. str.count('can')
- j. str.count('can',50,80)
- k. str.startswith("Hey")
- l. str.lstrip('H')
- m. str.replace('who', 'Goodbye')
- n. str.replace('who', 'Goodbye',1)
- o. str.endswith('!')
- p. str.partition('!')

- 13 For the string,

str= A year from now you may wish you had started today.

write the outputs of the followings.

- a. str[4:7]
- b. str[:7]
- c. str[4:]
- d. str[-len(str): len(str)]
- e. str[:-5] + str[-3:]
- f. '\$'.join(str)

14. Write a python script to solve the following problems.(Use loops and functions for the following problems)
- Write function `number_as_text(n)` which, for a given positive number, converts the respective digits into corresponding text.[Example: Input- 7, Output-'SEVEN', Input- 42, Output- 'FOUR TWO', Input-24680, Output- 'TWO FOUR SIX EIGHT ZERO']
 - Write function `calc_perfect_numbers(number_input)` that checks if the input number is Perfect number or not. [Hint- A perfect number if its value is equal to the sum of its real divisors. Example: 6, $1+2+3=6$]
 - Write function `calc_armstrong_numbers()` to compute all Armstrong numbers for x, y, and z as digits of the number.This deals with three-digit Armstrong numbers. [Example- 153, $1^3 + 5^3 + 3^3$]
 - Given a month and date, find which season does it belong to. Hint: Dec21-Mar20: winter, Mar21-June20: Spring, June21-Sep20: Summer, Sep21-Dec20: Fall.
 - Create function `calc_checksum(digits)` that performs the following position-based calculation for the checksum of a number of any length given as a string, with the n digits modeled as z_1 to z_n :
 $z_1 z_2 z_3 \dots z_n = (1 * z_1 + 2 * z_2 + 3 * z_3 + \dots n * z_n) \% 10$ [Example- Input- 11111, sum= $1*1+1*2+1*3+1*4+1*5=15$, result- $15 \% 10 = 5$]
15. (Don't use conditional and loops for the following problems)
- Create functions `add()`, `subtract()`, `multiply()`, `division()`, so that we can get same value for the following two expressions.

$$25 + 34 - 44 * 56 / 6$$

and

$$\text{subtract}(\text{add}(25,34),\text{multiply}(\text{division}(56,6),44))$$

- Write a python function `solution(a,b,c)` to find the quadratic roots of the equation

$$ax^2 + bx + c = 0.$$

Hint: The return statement should return a tuple=(root1,root2)

- Write a Python function `greetings(name)` that takes a string argument `name` and returns a greeting message in the format `'greetings name'`. For example, if the argument `'Alice'` is passed, the output should be `'greetings Alice!'`.
- Create a Python function `harmonic_mean(a, b, c)` that calculates the harmonic mean of three numbers using the formula

$$HM = \frac{3}{\frac{1}{a} + \frac{1}{b} + \frac{1}{c}}.$$

The function should return the harmonic mean for inputs `a=2, b=4, c=6`.

- Write a Python function to compute the sum of the squares of the first n natural numbers. You can use the formula:

$$S_n = \frac{n(n+1)(2n+1)}{6}$$

where S_n is the sum of the squares of the first n natural numbers.

16. In this exercise you will create a program that displays a multiplication table that shows the products of all combinations of integers from 1 times 1 up to and including 10 times 10. Your multiplication

table should include a row of labels across the top of it containing the numbers 1 through 10. It should also include labels down the left side consisting of the numbers 1 through 10. The expected output from the program is shown below:

	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

17. Write a function that accepts as an input parameter the number of rows to be printed and prints a figure like:

(a)

1
2 1 2
3 2 1 2 3
4 3 2 1 2 3 4

(b)

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

(c)

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