1. Write a Python Code to show the working of **Arithmetic Operators, Logical Operators and Bitwise Operators** in Python. Define a user-defined exception named "ZeroError" to validate the inputs as non-zero.

2. Write a Python Code to create a table named "**STUDENT**" in MySQL with fields snum, sname, m1, m2 and total and also perform **insert, update,delete and select rows** in the table.

3. Write a Python Code to **reverse the given number and also find the sum of its digits using FUNCTION reverse().** Let the function be without arguments and without return value**.**

4. Write a Python Code **to print the number as PRIME or NOT from 1 to n using FUNCTION prime()**. Raise exception when "n" is not a number.

5. Write a Python Code to print the list of **perfect numbers from 1 to n using FUNCTION perfect()**. The type of function is with arguments and no return type.

6. A. Write a Python Code to print the nature of roots of a quadratic equation using FUNCTION. The type of function is with arguments and with return type.

7. Write a Python Code to create a file named "**Employee.dat**" with empnum and empname. Insert every employee details line by line and copy the contents to another file "**Emp.dat**" in reverse order (ie) from last line towards first line.

8. Create a class called **Sample with an object variable "var"**. Write a Python Code to perform **Arithmetic Operator Overloading** for subtraction and multiplication, **Relational Operator Overloading** for less than, greater than and equal to and **Bitwise Operator Overloading** for bitwise and , or**.**

9. A. Do the following dictionary operations:

- Create a **DICTIONARY MARKS** with keys as names and values as marks (totally 5)
- Displays keys and values separately
- Display the student names who scores minimum and maximum marks
- Sort the student names as per their marks scored
- Modify the marks of a student and display it
- Delete a student and display it
- Show how many key-value pairs in the dictionary

10. Write a Python Code to **solve the following simultaneous equations using Scipy**:

$$x+y+z=2$$
$$6x-4y+5z=31$$
$$5x+2y+2z=13$$

Also find **the determinant** for the following matrix:

$$\begin{matrix} 4 & -3 & 0 \\ 2 & -1 & -2 \\ 1 & 5 & 7 \end{matrix}$$

11. A. Write a Python Code to create a **TUPLE T** of five colors.

- Justify tuple is an immutable data structure
- Print individual elements of tuple T
- Create two tuples with **T1 as colors starting with "b" and others in T2**
- Check if "orange" is in T or not.

- Can tuple allow duplicates?

12. DO THE FOLLOWING **STRING OPERATIONS**:

- Check whether the given string is palindrome or not using function check().
- Find the length of the given string.
- Check if the given two strings are equal or not.
- Read the following paragraph.

"Consider function f(n) the time complexity of an algorithm and g(n) is the most significant term. If f(n) <= C g(n) for all n >= 1, C > 0, then we can represent f(n) as O(g(n))"

- count "the" in the above input string.
- Count the number of uppercase letters, lowercase letters, numbers, special characters and spaces in the given text.
- Toggle lowercase into uppercase and vice versa.

13. Write a Python Code to create a file named "**Inventory.txt**" with pnum, pname, unitprice and amount; calculate the amount and store them in the file for FIVE products and display the written contents.

14. Write a Python Code to **define a USER-DEFINED MODULE to FIND MAXIMUM, MINIMUM, SUM AND AVERAGE OF GIVEN "n" NUMBERS.**

15. DO THE FOLLOWING **LIST OPERATIONS**:

- Create a **list mylist**.
- Read 10 numbers from user and add to the list.
- Sort mylist in both ascending and descending order.
- Create two lists **L1 and L2** having numbers divisible by 3 and not divisible by 3 respectively.
- Check the number is divisible by 3 or not using a function **func().**
- Remove the biggest number from L1 and the smallest number from L2.

16. Write a Python Code to create **two matrices using numpy** of order 3x3, compute matrix addition and matrix multiplication and display the results accordingly using nditer method.

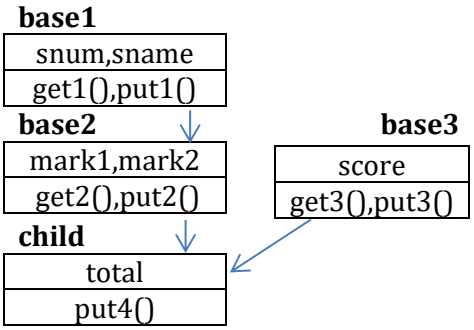
17. Write a Python Code to illustrate **the working of class, object, class variable, object variable, constructor, destructor and member functions.**

18. Create two sets named **Deepak and Uma**. The elements of Deepak are Python, Java, C, C++ while the elements of Uma are PHP, SQL, ASP.NET and C. Do the following:

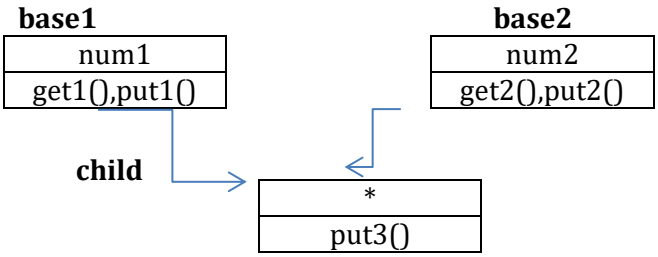
- Create the two sets and display them
- Find the common languages between Deepak and Uma
- List all the languages known by both of them
- List the languages known by Deepak and not by Uma
- List the languages known by Uma and not by Deepak
- Add "Go" to Deepak
- Remove "SQL" from Uma

19. Write a Python Code to create a **One-Dimensional numpy array of 5 elements using arange() function.** Print its size, dimension and compute basic statistics on the created array.

20. Write a Python Code to implement **HYBRID INHERITANCE**.

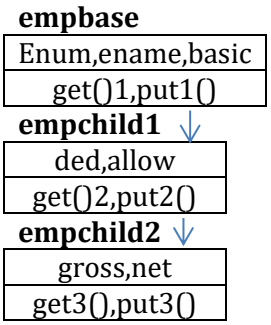


21. Write a Python Code to implement **MULTIPLE INHERITANCE**.

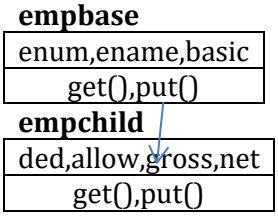


*Perform all arithmetic operations on num1 and num2, find the biggest between num1 and num2 and display the results.

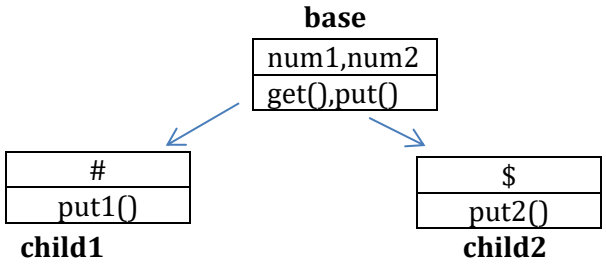
22. Write a Python Code to implement **MULTILEVEL INHERITANCE**.



23. Write a Python Code to implement **SINGLE INHERITANCE**.



24. Write a Python Code to implement **HIERARCHICAL INHERITANCE**.



Perform all arithmetic operations on num1 and num2 and num2 and display the results.
$ Perform all logical operations on num1 and num2 and display the results.

25. **'Courses':["Spark","PySpark","Hadoop","Python","Pandas",None,"Spark","Python"],**

'Fee' :[22000,25000,23000,24000,np.nan,25000,25000,22000],
'Duration':[30,50,55,40,60,35,45,50],
'Discount':[1000,2300,1000,1200,2500,1300,1400,1600]

a) How many rows and columns are there?
b) List the column names and its data types.
c) Print courses and duration columns for 1,3,5 rows.
d) List the courses whose discount lies between 1000 and 2000
e) Insert the new column: tutors = ['William', 'Henry', 'Michael', 'John', 'Messi', 'Ramana','Kumar','Vasu']
f) Rename fee column as fees
g) Print the statistics about null values in the above data frame.
h) List the Tutors start with "P"
i) List the courses whose span is more than 40 days.
j) Find the average discount and fees of each course.

26. **"country": ["Brazil", "Russia", "India", "China", "South Africa"],**

"capital": ["Brasilia", "Moscow", "New Delhi", "Beijing", "Pretoria"],
"area": [8.516, 17.10, 3.286, 9.597, 1.221],
"population": [200.4, 143.5, 1252, 1357, 52.98]

a) Sort country by population in descending order
b) Draw a Pie Chart for the area occupied by each country
c) Draw a Bar Chart for the population of each country
d) Slice only the country name and its population
e) Print the capital of Russia
f) Print the capital cities ending with "a"
g) Are there any null values across any column?
h) Which is the smallest country?
i) Print the countries whose area lies above 7.
j) Print the column names.

27. Do the following operations in Pandas.

employee	sales	Quarter	State
Sahay	125600	1	Delhi
George	235600	1	Tamil Nadu
Priya	213400	1	Kerala
Manila	189000	1	Haryana
Raina	456000	1	West Bengal
Manila	172000	2	Haryana
Priya	201400	2	Kerala

a) List the states lie in quarter 1
b) Print the employees of quarter 2
c) Display employee names along with their state
d) Which employee's sales lies above 200000?
e) Show the state wise sales.
f) Find the mean, median, maximum and minimum sales quarterwise.
g) Whose sales is than the average sales of Kerala?
h) Print employee names without duplicates.
i) Show the states having letter "e" in its name.
j) Draw a plot for employee against their sales.

28. Write a Python Code to do the following operations:

Name	Dept	Type	Salary	Years
Asha	Administration	Fulltime	120000	10
Harsh	Marketing	Intern	50000	2
Sourav	Technical	Intern	70000	3
Hritik	Technical	Parttime	67800	4
Shivansh	Administration	Parttime	55000	7
Akash	Marketing	Fulltime	57900	3
Soumya	Technical	Intern	64300	2
Karthik	Administration	Intern	110000	8

a) List the employees of each employment type
b) List the part-time employees of Technical department
c) Find average and total salary of each department
d) Display the employee details with experience greater than 2.
e) Print the summary info of the dataset.
f) Who is earning more salary in Intern.
g) Draw a bar graph for employee's experience
h) Who is the least salaried person?
i) How many departments are there and print their names too.

29. Write a Python Code for the following operations:

	age	section	city	gender	favourite_color
0	10	A	Gurgaon	M	red
1	22	B	Delhi	F	NaN
2	13	C	Mumbai	F	yellow
3	21	B	Delhi	M	NaN
4	12	B	Mumbai	M	black
5	11	A	Delhi	M	green
6	17	A	Mumbai	F	red

a) Group the colors according to city.

b) Display the gender and favorite_color of the person with age less than 20.
c) List the city ends with i
d) Show the number of null values across each column.
e) Fill the null values with orange.
f) Print the city names without duplicates.
g) How many males and females are there in total?
h) Average age group of each city.
i) Print the total age as per section.
j) How many persons are there in each city?

30. Write a Python Code to do the following operations:

	name	note	profession	date_of_birth	group
0	John	92	Electrical engineer	1998-11-01	A
1	Jane	94	Mechanical engineer	2002-08-14	B
2	Emily	87	Data scientist	1996-01-12	B
3	Lisa	82	Accountant	2002-10-24	A
4	Matt	90	Athlete	2004-04-05	C

a. List the first two largest and smallest rows based on "note" column
b. Display the first 2 rows with the name and note columns
c. List the rows whose note is greater than 90
d. Show the names of engineers.
e. Show persons' details whose name starts with "J"
f. List the people who are data scientist or have a note more than 90.
g. List the last 3 rows and the third column
h. List the names who are either in group A or C using isin.
i. List the names of athelete.
j. List the persons whose date of birth is greater than 2000.

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