Python Programming

Tasks
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1. Write a program to find area of a Right Angle Triangle.

2. Write a program to find the area and circumference of a circle.

3. Write a program to accept degree Celcius and convert it to degree Farhentite.

4. Check a given integer is
   [a] Prime or not
   [b] An Armstrong number or not

5. Check if the given three sides of a triangle represents a right angle triangle based on Pythogerous Therom

6. Generate the following:
   [a] All prime number upto the specified limit.
   [b] All Armstrong number between 1 and 500
   [c] Fibonacci series upto a specified limit

7. Accept a string from the user the perform the following:

   [a] Count the number of VOWELS and CONSONANTS.
       Besides finding the frequency of vowels and consonants againts the total number of characters in the string.

   [b] Check if the string is a PALINDROME string or not.

   OPTIONAL
   [c] Generate the PIGLATIN words for a multi-word string.

8. Write a program to accept a IP Address from the user and validate it.

   I hope we are aware that the IP Address has FOUR Octects and the valid values for each of the octect is in the range of 0 to 255.

9. Implement the STACK Data Structure. It should be a menu-driven program with the following options:

              Stack Operations
              ----

              1. Push

              2. Pop

              3. Display

              4. Quit

              Your choice [1-4]:

10. Write a program to evaluate a valid Postfix Expression.

```
    Assumptions:
    * The user enters a valid postfix expression.
    * Only single digit operands are given in the expression.
```

11. Write program to perform the following:
    [a] Find the sum of two matrices
    [b] Transpose a matrix
    [c] Multiply two matrices.

    NOTE: The size of the matrix will be decided at run-time.

12. Build an application which takes the names of team members
    and holds them in an appropriate data strcutres. The app
    should take names of teams like Cricket and Football.

    Later perform the following:
    [a] Identify players who will play both Cricket and
        Football.
    [b] Idetify players who only play either Cricket or
        Football.
        Give the choice to the user to specify the game
        name.

13. Build a CRUD application for the RTO (Regional Tansport Office)
    The RTO members are not in a position to identify the vehicle
    is registered with what state. They think a vehicle reg. no.
    start with 'UK' is from United Kingdom.

    Thus build the CRUD app, which will hold the State Code and the
    State Name in an appropriate data structure.

    It should be a menu-driven program with the following operations:

                    CRUD Operations
                    ================

                    1. Create

                    2. Read

                    3. Update

                    4. Delete

     Business Norms:
    * Duplicate State Code cannot be assigned while creation.
    * If the State Code is not found appropriate message should be
      displayed.
     * Updation and Deletion should be done on confirmation.

14. Write a program to simulate the 'evn' command of the Linux
    Operating System.

    HINT: The 'os' module has the 'environ' dictornary.

15. Write functions for the following:

    isleap()   The argument passed is a leap year or not.

```
                Should return bool value.
        isprime()    The argument passed is a Prime number or not.
        isarmstrong()
                The agument passed is an Armstrong number or not.
        isipaddr()  The argument passed as an IP Address is a valid
                IP Address or not.
        isdate()     Takes an argument as a string in the format as
                follows:   DD-MON-YYYY
                The function should validate that the given string
                represent a valid date in the above given format.
                Care should be taken for Leap Year.
```

Write a driver Python program to check if the above defined functions are working are not.

16. Write a functions for the follow:

[a] Function which will return all the Pythagorean Triple (as tuple(s)) for the specified limit passed as an argument.

[b] Function which will calculate the net pay of an employee based on the following:

The ID, Name, Salary and Gender will be passed as argument to the function in arbitrary order.

The ID will help in identification of the employee as a Full time or Part-Time employee. If the first char. is 'F' then it is a full time-employee, however if it is 'P' then the employee is a part-time employee.

```
For full time employee:
Net Pay = Basic Salary + HRA + DA - PF
HRA is 30% of the basic salary
DA is 20% for Female employees, and 15% for male employees
PF is 8% of the basic salary.

For part time employee:
Net Pay = Basic Salary - PF
PF is 8% of the basic salary
```

[c] Function which will print the specified character the specified number of time.

The default char is '*' and the number is 40

[d] A greeting function will take a title like, Mr./Mrs./Ms/Dr/Shri etc. the persons name and the message.

Your function should be able to take the parameters in an arbitrary order and display the greeting in the following format:

```
<Title> <Name>
<Message...............>
```

[e] Accept N as an argument to the function which will generate a Fibonacci series upto the given limit.

A Fibonacci series is a series of numbers where the initial two numbers are 0 and 1 and the next number is the sum of the previous two numbers.

[f] Design a function which will take a list or tuple as an argument and displays a Histogram for the values available in the seq. object as follows:

```
Object
a[ 0 ] = 5;  + + + + +
a[ 1 ] = -3; - - -
a[ 2 ] = -6; - - - - - -
a[ 3 ] = 8;  + + + + + + + +
```

Write a driver program to check the above functions are working as per the expectations.

17. You Project Manager is impressed with your Python skill and want you to implement the following functions:

```
left(string, n)    Return the left most 'n' characters of the string
right(string, n)   Return the right most 'n' characters of the string
mid(string, p, n)  Return a sub string from the specified position p
                of 'n' charaters.
str_reverse(string) Return the reversed string of the given string
count_vowels(str)  Return the count of vowels in a given string
count_consonants(str)
find_all(str, sub) Return all indices of the 'sub' string in the
                string 'str'
factorial(n) Return the factorial of 'n' using recursion.
fibo(n)      Return the 'n' Fibonacci number in the series.
gcd(m, n)          Return the Greatest Common Divisior of 'm' and 'n'
lcm(m, n)          Return the Least Common Multiple of 'm' and 'n'
tower_hanoi( )     Display the disk movement in case of the Tower of
                Hanoi game.
```

NOTE: For all the functions it is MANDATORY to specify the Documentation   String.

18. Create a module by name CString which will have the following string functions:

```
left(string, n)    Return the left most 'n' characters of the string
right(string, n)   Return the right most 'n' characters of the string
mid(string, p, n)  Return a sub string from the specified position p
                of 'n' charaters.
str_reverse(string) Return the reversed string of the given string
count_vowels(str)  Return the count of vowels in a given string
count_consonants(str)
find_all(str, sub) Return all indices of the 'sub' string in the
                string 'str'
```

Create a self test module and check the functionality of the functions

19. Create a module by name 'Recursion' which will have the following

functions:

```
factorial(n)    Return the factorial of 'n' using recursion.
fibo(n)         Return the 'n' Fibonacci number in the series.
gcd(m, n)           Return the Greatest Common Divisior of 'm' and 'n'
lcm(m, n)           Return the Least Common Multiple of 'm' and 'n'
tower_hanoi( )      Display the disk movement in case of the Tower of
                Hanoi game.
```

Create a self test module and check the functionality of the functions

20. Write Python command line arguemnt utilities to simulate the following
command of UNIX/Linux Operating System

    [a] head command
    [b] tail command
    [c] nl command

21. Build an utility by name 'tailchar' which will display the contents
     of the given file in reverse order of the character(s)

     The syntax is: tailchar.py [n] <filename>

     If 'n' is not specified it is default to 10 characters.
     Care should be take if 'n' is more than the size of the file.

22. Build an utility by name 'wf' abbrevated as "word frequencey"
     which should find the frequency of words for the given text file.

     Care should be taken between uppercase, title-case and lowercase
     words.

23. Build an utiltity by name 'append.py' which will enable to the
     user to append the contents of the source file to the target
     file.

     Syntax: append.py [source] <target>

     If the source is not specified the data should be taken from
     stdin and then appened.

24. Build an utility by name 'mirrorcopy.py' which will copy the
     contents of the file as a mirror image.

25. A client would like to build a simple Product Maintenance System which
    stores Product details like Item ID, Name (description) of the Item,
    Cost Price, Selling Price, Product Movement and QOH (Quantity on
Hand).

    Using your Python Programming skills build this client application
    which will enable a user to store product/item details in a CSV file
    by name ITEMS.CSV.

    Make sure that the following criteria's are taken care:

a) Item IDs and Item Name are not empty.
b) Cost Price as well as Selling Price are valid real numbers in fractional form. Moreover the Selling Price is 20% more than the Cost Price of the item.
c) Product Movement stores only F, S or N letters, which indicate Fast Moving, Slow Moving and Non Moving items.
d) Quantity on hand is a valid integer.

NOTE:
• Ensure that the application is modular in design.

26. The ITEMS.CSV file contains information about different items available
in a super market.

It has the following components:

Item ID, Name, Product/Item Type, Cost Price, Selling Price and QOH (Quantity on Hand).

A sample portion of the ITEMS.CSV file is at your disposal.

```
I105,Rice,F,30.0,34.0,567
I124,Wheat,F,18.25,20.5,712
I147,Ragi,S,15.25,17.25,118
I209,Dove 100g,N,14.0,15.0,127
```

The third component of the item's record states whether the item is Fast moving (F), Slow moving (S) or Non-moving (N) item.

Develop a simple Python application which will read such a file and generate a report for the Stores Manager to get a count of item types along with the stock value of that particular type as specified by the Stores Manager.

27. A module of the LMS (Library Management System) requires details of books to be stored in a text file by name "TITLES.DAT". You as an SME in Python Programming enable the Software Development team to achieve this task.

A partial list of the book details are given for your reference. It is as follows:

```
88964~Java Programming~Yakov Fain~Java~$45
98745~Let Us C~Yashwanth~C~$50
56431~Head First C#~Jennifer~.NET~$90
99774~Head First Java~Kathy~Java~$90
23456~ASP.NET~Vinod Rai~.NET~$50
25256~C# Programming~Rakesh Rajan~.NET~$50
```

The different components of the book are as follows: ISBN-NO, Title, Author, Category and Price

NOTE
• Care should be taken to ensure that ISBN-NO and Title of the book are not empty.
• A book can have multiple authors. Provision for storing the names of multiple authors should be available.

- The price of the book is a positive integer in Dollars.
- Proper formatting of the book details should be done to ensure that each and every book record is of same length.

28. The EMPLOYEE.DAT file contains information about employees in an organization. It has the following components:

    Emp ID, Name, Competency, Gender, BU and Salary

    E101:Raj Kumar:C4:M:Corp:35000
    E102:Anita Singh:C3:F:ITS:26500
    E103:Shiva:C4:M:Testing:22500
    E104:Roopa:C5:F:Corp:33500

    Write a Python program which will generate a report for the Finance Manager indicating the Business Unit wise total salary spent.

29. The LMS (Library Management System) has information about the books in a file by name TITLES.DAT. It has the following components:

    ISBN-NO, Title, Author, Category and Price

    88964~Java Programming~Yakov Fain~Java~$45
    98745~Let Us C~Yashwanth~C~$50
    56431~Head First C#~Jennifer~.NET~$90
    99774~Head First Java~Kathy~Java~$90
    23456~ASP.NET~Vinod Rai~.NET~$50
    25256~C# Programming~Rakesh Rajan~.NET~$50

    A user want to search book based on a specific category. For example, if the user specifies Java, a complete list of books related to Java should be displayed. However, if the category is different, a different set of books should be displayed appropriately.

    If no books of a specific category are found, appropriate message should be displayed.

    You as a Python Programming SME, write a program which will help in listing books of a specific category.