

FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING.
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Aim: Write python programs to implement different expressions, variables, Quotes, Basic Math operations, decision making and looping statements etc.

Write python programs

- a. To compute prime factors of an integer.
- b. List Slicing and divisibility
- c. To Find all Numbers in a Range which are Perfect Squares and Sum of all Digits in the Number is Less than 10

Objective of the Experiment:

1. Understanding expressions, variables, Math operations, control structures etc.

Algorithms:

a. Algorithm to compute prime factors:

1. Take the value of the integer and store in a variable.
2. Using a while loop, first obtain the factors of the number.
3. Using another while loop within the previous one, compute if the factors are prime or not.
4. Exit.

b. Create a list of numbers from 1 to 50 named list_1. The numbers should be present in the increasing order: Ex list_1 = [1,2,3,4,5,...,50]

1. Given an input of two numbers, let's say a and b, you have to print the numbers returned by the command list_1[a:b]

Input: The first line of input contains two numbers a and b separated by a space. Make sure you convert the strings in a and b into integers using the int() command

Output: Print the numbers in new line

2. Given an input let's say a, you have to print the number of elements of list_1 which are divisible by a, excluding the element which is equal to a.

Input: Number a

Output: In a single line, the number of elements (i.e. the count and not the elements) which are divisible by a.

Example: Input: 24

Output: 1

c. Algorithm to find all numbers in a range which are perfect squares and sum of all digits in the number is less than 10.

1. User must enter the upper and lower range for the numbers.
2. A list must be created using list comprehension where the element is a perfect square within the range and the sum of the digits of the number is less than 10.
3. This list must then be printed.
4. Exit

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Source code for the implementation:

(Write only important functions)

Post Lab Assignment:

1. One of the following 10 statements generates an error. Which one? (Your answer should be a number between 1 and 10.)

`x = [1,"abcd",2,"efgh",[3,4]]` # Statement 1

`y = x[0:50]` # Statement 2

`z = y` # Statement 3

`w = x` # Statement 4

`x[1] = x[1][0:3] + 'd'` # Statement 5

`y[2] = 4` # Statement 6

`z[0] = 0` # Statement 7

`x[1][1:2] = 'yzw'` # Statement 8

`w[4][0] = 1000` # Statement 9

`a = (x[4][1] == 4)` # Statement 10

2. What would happen if we call `gcd(m,n)` with `m` positive and `n` negative in the following definition?

```
def gcd(m,n):
    if m < n:
        (m,n) = (n,m)
    if (m % n) == 0:
        return(n)
    else:
        diff = m-n
        return (gcd(max(n,diff),min(n,diff)))
```

A. The behaviour depends on the exact values of `m` and `n`.

B. The function would still compute gcd correctly.

C. The function would not terminate.

3. Write a python program to find GCD of two numbers. (without using Euclid's algorithm)
4. A positive integer `n` is said to be perfect if the sum of the factors of `n`, other than `n` itself, add up to `n`. For instance 6 is perfect since the factors of 6 are {1,2,3,6} and $1+2+3=6$. Likewise, 28 is perfect because the factors of 28 are {1,2,4,7,14,28} and $1+2+4+7+14=28$.

Write a Python function `perfect(n)` that takes a positive integer argument and returns True if the integer is perfect, and False otherwise.

Here are some examples to show how your function should work.

```
>>> perfect(6)
```

```
True
```

```
>>> perfect(12)
```

```
False
```