**Python Programms :**

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**# 1. Armstrong number :-**

**Code:**

def armstrong(num):

digits = str(num)

return num == sum(int(digit) \*\* len(digits) for digit in digits)

number = int(input("Enter a num: "))

print(f"{number} is an Armstrong number." if armstrong(number) else f"{number} is not an Armstrong number.")

**Input :** Enter a num : 153

**Output :** 153 is an Armstrong number.

**# 2. Simple interest :-**

**Code:**

P = float(input("Principal amount: "))

R = float(input("Annual interest rate (%): "))

T = float(input("Time (years): "))

interest = (P \* R \* T) / 100

print(f"Simple interest: {interest}")

**Input :** principal amount : 2000

Annual interest rate(%) : 10

Time (years): 5

**Output :** Simple interest: 1000.0

**# 3. Happy number :-**

**Code:**

n = 19

seen = set()

while n != 1 and n not in seen:

seen.add(n)

n = sum(int(d)\*\*2 for d in str(n))

if n == 1:

print(f"{n} is a happy number.")

else:

print(f"{n} is not a happy number.")

Input : 19

Output : 19 is a happy number.

**# 4. Number of factors :**

**Code:**

def print\_factors(x):

print("The factors of",x,"are:")

for i in range(1, x + 1):

if x % i == 0:

print(i)

num = 320

print\_factors(num)

**Input :** 320

**Output :** The factors of 320 are:

1,2,4,5,8,10,16,20,32,40,64,80,160,320.

**# 5. Square and cube :-**

**Code:**

number = int(input("Enter a number: "))

print("square:",number\*\*2,"cube:" ,number\*\*3)

**Input :**  Enter a number : 5

**Output :** square : 25 , cube : 125

**# 6.Binary to decimal and octal :-**

**Code:**

binary\_number = "101010"

decimal\_number = int(binary\_number, 2)

print(decimal\_number)

octal\_number = oct(decimal\_number)

print(octal\_number)

**Input :** 101010

**Output :** 42

0052

**# 7. Add given two binary strings :-**

**Code:**

a = "11"

b = "1"

int\_a = int(a, 2)

int\_b = int(b, 2)

sum\_int = int\_a + int\_b

binary\_sum = bin(sum\_int)[2:]

print(binary\_sum)

**Input :** a=11, b=1

**Output:**100

**# 8. Greatest of three binary number :-**

**Code:**

binary1 = input("Enter the first binary number: ")

binary2 = input("Enter the second binary number: ")

binary3 = input("Enter the third binary number: ")

decimal1 = 0

decimal2 = 0

decimal3 = 0

def binary\_to\_decimal(binary):

decimal = 0

power = 0

for digit in binary[::-1]:

if digit == '1':

decimal += 2 \*\* power

power += 1

return decimal

decimal1 = binary\_to\_decimal(binary1)

decimal2 = binary\_to\_decimal(binary2)

decimal3 = binary\_to\_decimal(binary3)

if decimal1 > decimal2 and decimal1 > decimal3:

greatest\_binary = binary1

elif decimal2 > decimal1 and decimal2 > decimal3:

greatest\_binary = binary2

else:

greatest\_binary = binary3

print("The greatest binary number is:", greatest\_binary)

**Input :** Enter the first binary number:10

Enter the second binary number:101

Enter the third binary number:01

**Output :** The greatest binary number is:101

**# 9. Matrix multiplication :-**

**Code:**

A = [[1, 2, 3], [4, 5, 6]]

B = [[7, 8], [9, 10], [11, 12]]

result = [

[sum(A[i][k] \* B[k][j] for k in range(len(B))) for j in range(len(B[0]))]

for i in range(len(A))

]

for row in result:

print(row)

**Output :** [58, 64]

[139, 154]

**# 10. Matrix addition :-**

**Code**

matrix1 = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

matrix2 = [

[9, 8, 7],

[6, 5, 4],

[3, 2, 1]

]

result = [[matrix1[i][j] + matrix2[i][j] for j in range(len(matrix1[0]))] for i in range(len(matrix1))]

for row in result:

print(row)

**Output :** [10, 10, 10]

[10, 10, 10]

[10, 10, 10]