**1. Armstrong number**

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.")

**2. Simple interest**

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}")

**3. Happy number**

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.")

**4. Number of factors**

number = 28

n = 5

factors = [i for i in range(1, number + 1) if number % i == 0]

print(f"The number of factors of {number} is: {len(factors)}")

print(f"The first {n} factors of {number} are: {factors[:n]}"

**5. Square and cube**

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

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

**6.Binary to decimal and octal**

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

decimal = 0

power = 0

for digit in binary[::-1]:

if digit == '1':

decimal += 2 \*\* power

power += 1

print("the decimal value: ",decimal)

octal = ""

current = decimal

while current > 0:

remainder = current % 8

octal = str(remainder) + octal

current = current // 8

print("The octal value is:", octal)

**7. Add given two binary strings**

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)

**8. Greatest of three binary number**

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)

**9. Matrix multiplication**

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)

**10. Matrix addition**

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)