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def uscln(a, b):
    if (b == 0):
        return a
    return uscln(b, a % b)

def Add(x, y):
    max_len = max(len(x), len(y))

    x = x.zfill(max_len)
    y = y.zfill(max_len)

    # initialize the result
    result = ''

    # initialize the carry
    carry = 0

    # Traverse the string
    for i in range(max_len - 1, -1, -1):
        r = carry
        r += 1 if x[i] == '1' else 0
        r += 1 if y[i] == '1' else 0
        result = ('1' if r % 2 == 1 else '0') + result
        carry = 0 if r < 2 else 1      # Compute the carry.

    if carry != 0:
        result = '1' + result

    return result.zfill(max_len)

def normaliseString(str1, str2):
    diff = abs((len(str1) - len(str2)))
    if diff != 0:
        if len(str1) < len(str2):
            str1 = ('0' * diff) + str1

        else:
            str2 = ('0' * diff) + str2

    return [str1, str2]

def Sub(str1, str2):
    if len(str1) == 0:

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        return
    if len(str2) == 0:
        return

    str1, str2 = normaliseString(str1, str2)
    startIdx = 0
    endIdx = len(str1) - 1
    carry = [0] * len(str1)
    result = ''

    while endIdx >= startIdx:
        x = int(str1[endIdx])
        y = int(str2[endIdx])
        sub = (carry[endIdx] + x) - y

        if sub == -1:
            result += '1'
            carry[endIdx-1] = -1

        elif sub == 1:
            result += '1'
        elif sub == 0:
            result += '0'
        else:
            raise Exception('Error')

        endIdx -= 1

    return result[::-1]

def Mul(binOne, binTwo):
    i = 0
    rem = 0
    sum = []
    bProd = 0
    while binOne != 0 or binTwo != 0:
        sum.insert(i, (((binOne % 10) + (binTwo % 10) + rem) % 2))
        rem = int(((binOne % 10) + (binTwo % 10) + rem) / 2)
        binOne = int(binOne/10)
        binTwo = int(binTwo/10)
        i = i+1
    if rem != 0:
        sum.insert(i, rem)
        i = i+1

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i = i-1
while i >= 0:
    bProd = (bProd * 10) + sum[i]
    i = i-1
return bProd

a = int(input("So nguyen a: "))
b = int(input("So nguyen b: "))

print("chuyen doi so thap phan sang nhi phan")
a1 = bin(a)
b1 = bin(b)
a2 = format(a, "b")
b2 = format(b, "b")
# print(max(len(a1),len(b1)))
print("{0}\t->\t{1}\n{2}\t->\t{3}".format(a, a2, b, b2))
print("Ket qua cua 3 phep tinh:")
print("{0} + {1} = {2}".format(a, b, int(Add(a1, b1), 2)))
# print("{0}\t-
>\t{1}\n".format(int(binarySubstraction(a1,b1),2),binarySubstraction(a1,b1)))
print("{0} - {1} = {2}".format(a, b, int(Sub(a2, b2), 2)))

binMul = 0
factr = 1
binOne = int(a2)
binTwo = int(b2)
while binTwo != 0:
    digit = binTwo % 10
    if digit == 1:
        binOne = binOne * factr
        binMul = Mul(binOne, binMul)
    else:
        binOne = binOne * factr
    binTwo = int(binTwo/10)
    factr = 10

print("{0} * {1} = {2}".format(a,b,int(str(binMul),2)))
print("Euclid cua {0} va {1} la {2}".format(a,b,uscln(a,b)))

print("-----")

conversion_table = {0: '0', 1: '1', 2: '2', 3: '3',
                    4: '4', 5: '5', 6: '6', 7: '7',
                    8: '8', 9: '9', 10: 'A', 11: 'B',

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12: 'C', 13: 'D', 14: 'E', 15: 'F'}
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def dec2hex(decimal):
    hexadecimal = ''
    while(decimal > 0):
        remainder = decimal % 16
        hexadecimal = conversion_table[remainder] + hexadecimal
        decimal = decimal // 16

    return hexadecimal

print("2 - Nhi Phan\n8 - Bat Phan\n10 - Thap Phan\n16 - Thap Luc Phan\n")
dec = int(input("So nguyen = "))
coso = int(input("Nhap he co so = "))
if(coso == 2):
    print("{0} -> {1} theo he co so {2}".format(dec, format(dec, "b"), coso))
elif(coso == 8):
    print("%d -> %o theo he co so %d" % (dec, dec, coso))
elif(coso == 10):
    print("{0} -> {1} theo he co so {2}".format(dec, dec, coso))
elif(coso == 16):
    print("{0} -> {1} theo he co so {2}".format(dec, dec2hex(dec), coso))
else:
    print("Sai input")
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So nguyen a: 75
So nguyen b: 35
chuyen doi so thap phan sang nhi phan
75      ->      1001011
35      ->      100011
Ket qua cua 3 phep tinh:
75 + 35 = 110
75 - 35 = 40
75 * 35 = 2625
Euclid cua 75 va 35 la 5
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2 - Nhi Phan
8 - Bat Phan
10 - Thap Phan
16 - Thap Luc Phan

So nguyen = 81
Nhap he co so = 16
81 -> 51 theo he co so 16
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