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'''
Chp1 : TP N°2 Les Piles
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Date : 23-09-2023
'''
# Pile
def creer_pile():
    l = list()
    return l
    # return []

def pile_vide(p):
    return len(p)==0 # return p == []

def taille(p):
    return len(p)

def sommet(p):
    if not pile_vide(p):
        return p[-1] #p[len(p)-1]
    #return None

#test
'''
p = creer_pile()
s = sommet(p)
if s != None:
    print("sommet:",s+1)
'''

def sommet1(p):
    assert not pile_vide(p)
    return p[-1]

#test
'''p = creer_pile()
try:
    s = sommet1(p)
except :
    print("pas de sommet")
else:
    print("sommet : ",s)'''

def empiler(p,x):
    p.append(x)

#test
'''p = creer_pile()
empiler(p,3)'''

def depiler(p):
    if not pile_vide(p):
        x = p.pop()
        return x
    else:
        raise Exception("Pile vide")

#test
'''p = creer_pile()
try:
    s = depiler(p)
except:
    print("pile vide, pas sommet")'''

def depiler1(p):
    return p.pop()

# Ex 1

def conversion(n):
    p = creer_pile()
    if n==0: return '0b0'
    while n!=0 :
        r = n % 2
        empiler(p,r)
        q = n // 2
        n = q

    ch = '0b'
    for i in range(taille(p)):
        ch = ch + str(depiller(p))

    return ch

```

```

def verif_parentheses(ch):
    p = creer_pile()
    L = []
    for i in range(len(ch)):
        if ch[i] == '(': empiler(p,i)
        elif ch[i] == ')':
            if pile_vide(p): return False
            t = (depiler(p),i)
            L.append(t)
    if pile_vide(p): return L
    return False

```

```

def calc_expr_arith(expr):
    # expr : post fixée
    p = creer_pile()
    for e in expr:
        if e.isdigit():
            empiler(p,int(e))
        else:
            b = depiler(p)
            a = depiler(p)
            #e : opération de type str
            if e == '+': r = a + b
            elif e == '-': r = a - b
            elif e == '*': r = a * b
            elif e == '/': r = a / b
            empiler(p,r)
    return sommet(p)

```

Ex 3

```

def permut_circ(p,n):
    p1 = creer_pile()
    for i in range(n):
        s = depiler(p)
        #vider p dans p1
        while taille(p)>0:
            empiler(p1,depiler(p))
        # mettre s au fond de p
        empiler(p,s)

        #remettre les elts de p
        while taille(p1)>0:
            empiler(p,depiler(p1))

```

Ex 4

```

def somme(p):
    if taille(p)==0 :
        return 0
    else:
        s= depiler(p)
        if type(s)==int:
            return s + somme(p)
        else:
            return somme(s) + somme(p)

```