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import random as rd
n = 20
a = [rd.randint(0, 10) for k in range(n)]

def amplitude(a):
    haut, bas = a[0], a[0]
    for k in range(1, len(a)):
        if a[k] > haut:
            haut = a[k]
        if a[k] < bas:
            bas = a[k]
    return haut - bas

def gain_3(a):
    resultat = 0
    for j in range(len(a)):
        for i in range(j):
            delta = a[j] - a[i]
            if delta > resultat:
                resultat = delta
    return resultat

def gain_4(a):
    resultat, date_1, date_2 = 0, 0, 0
    for duree in range(1, len(a)):
        for i in range(len(a) - duree):
            j = i + duree
            delta = a[j] - a[i]
            if delta > resultat:
                resultat, date_1, date_2 = delta, i, j
    return resultat, date_1, date_2

def gain_5(a):
    mini, resultat = a[0], 0
    for k in range(1, len(a)):
        if a[k] - mini > resultat:
            resultat = a[k] - mini
        if a[k] < mini:
            mini = a[k]
    return resultat

def gain_6(a):
    mini, resultat, date_mini, date_1, date_2 = a[0], 0, 0, 0, 0
    for k in range(1, len(a)):
        if a[k] - mini > resultat or (a[k] - mini == resultat and k -
date_mini < date_2 - date_1):
            resultat = a[k] - mini
            date_1, date_2 = date_mini, k
        if a[k] <= mini:
            date_mini, mini = k, a[k]
    return [resultat, date_1, date_2]

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def gain_7(a):
    total = 0
    for i in range(1, len(a)):
        r1 = gain_6(a[:i])
        r2 = gain_6(a[i:])
        if r1[0] + r2[0] > total:
            total = r1[0] + r2[0]
            r2[1] += i
            r2[2] += i
            resultat = r1, r2
    return resultat

# sans faire de copies :
def gain_5_bis(a, p, q):
    g = 0
    min_courant = a[p]
    for j in range(p+1, q):
        if a[j] - min_courant > g:
            g = a[j] - min_courant
        if a[j] < min_courant:
            min_courant = a[j]
    return g

def gain_7_bis(a):
    g = 0
    for coupure in range(len(a)):
        g1 = gain_5_bis(a, 0, coupure)
        g2 = gain_5_bis(a, coupure, len(a))
        if g1 + g2 > g:
            g = g1 + g2
    return g

print('a : ', a)
print('amplitude(a) : ', amplitude(a))
print('gain_3(a) : ', gain_3(a))
print('gain_4(a) : ', gain_4(a))
print('gain_5(a) : ', gain_5(a))
print('gain_6(a) : ', gain_6(a))
print('gain_7(a) : ', gain_7(a))
print('gain_7_bis(a) : ', gain_7_bis(a))

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