ISM MPSI/PCSI, Informatique
Année 2025/2026

Corrigé du TP Informatique 25

Exercice 1

On saisit :

```
def negatif(tab):
    L,C=len(tab),len(tab[0])
    return [[255-tab[i][j] for j in range(C)] for i in range(L)]
```

Exercice 2

1. On saisit :

```
def assombrir(tab,s):
    L,C=len(tab),len(tab[0])
    return [[int(s*tab[i][j]) for j in range(C)] for i in range(L)]
```

2. On saisit :

```
def eclaircir(tab,s):
    L,C=len(tab),len(tab[0])
    return [[int(255*(1-s)+s*tab[i][j]) for j in range(C)] for i in range(L)]
```

FIGURE 1 – Négatif, image assombrie et éclaircie

Exercice 3

On saisit :

```
def homothetie(tab,mu):
    L,C=len(tab),len(tab[0])
    mL,mC=int(mu*L),int(mu*C)
    res=[[0]*mC for k in range(mL)]
    i0,j0=L//2,C//2
    I0,J0=mL//2,mC//2
    def xy_ij(x,y):
        return int(i0-y),int(j0+x)
    def IJ_XY(I,J):
        return J-J0,I0-I
    for I in range(mL):
        for J in range(mC):
            X,Y=IJ_XY(I,J)
            x,y=1/mu*X,1/mu*Y
            i,j=xy_ij(x,y)
            res[I][J]=tab[i][j]
    return res
```

Exercice 4

On saisit :

```
def rotation(tab,a):
    L,C=len(tab),len(tab[0])
    i0,j0=L//2,C//2
    def xy_ij(x,y):
        return int(i0-y),int(j0+x)
    def ij_xy(i,j):
        return j-j0,i0-i
    def deborde(i,j):
        return i<0 or i>=L or j<0 or j>=C
    res=[[0]*C for k in range(L)]
    ca,sa=np.cos(a),np.sin(a)
    for I in range(L):
        for J in range(C):
            X,Y=ij_xy(I,J)
            x,y=ca*X+sa*Y,-sa*X+ca*Y
            i,j=xy_ij(x,y)
            if not deborde(i,j):
                res[I][J]=tab[i][j]
    return res
```