

Transformée de Fourier

1)

```
import numpy as np

N=8
Fe = 10000

for i in range( 0 , N ) :
    print("F(", i, ") = " , (Fe/N) * i , "\n")
print("F(0) = 0\n")
print("F(mediane) = " , Fe/2)
```

```
→ TP2 python tp2.py
('F(', 0, ') = ', 0, '\n')
('F(', 1, ') = ', 1250, '\n')
('F(', 2, ') = ', 2500, '\n')
('F(', 3, ') = ', 3750, '\n')
('F(', 4, ') = ', 5000, '\n')
('F(', 5, ') = ', 6250, '\n')
('F(', 6, ') = ', 7500, '\n')
('F(', 7, ') = ', 8750, '\n')
F(0) = 0

('F(mediane) = ', 5000)
→ TP2
```

L'indice de la fréquence 0 est 0.

L'indice de la fréquence médiane est 4.

2)

```
import numpy as np

N=8

xn = [1,0,0,0,0,0,0,0]

Xk = np.fft.fft(xn, N)
print(Xk)
```

```
→ TP2 python tp2.py
[ 1.+0.j  1.+0.j  1.+0.j  1.+0.j  1.+0.j  1.+0.j  1.+0.j  1.+0.j]
```

On peut voir que tous les modules possèdent la même valeur.

3)

```
import numpy as np
```

```
N=8
```

```
xn = [1,1,1,1,1,1,1,1]
```

```
Xk = np.fft.fft(xn, N)  
print(Xk)
```

```
[ 2.+0.j  2.+0.j  2.+0.j  2.+0.j  2.+0.j  2.+0.j  2.+0.j  2.+0.j]  
→ TP2 python tp2.py  
[ 8.+0.j  0.+0.j  0.+0.j  0.+0.j  0.+0.j  0.+0.j  0.+0.j  0.+0.j]  
→ TP2
```

Le premier module passe à 8 et les autres sont maintenant nuls

4)

```
import numpy as np
```

```
N=8
```

```
xn1 = [1,2,1,0,0,0,0,0]  
xn2 = [-1,1,1,1,2,-2,0,0]
```

```
Xk1 = np.fft.fft(xn1, N)  
Xk2 = np.fft.fft(xn2, N)  
conv = np.convolve(Xk1, Xk2)  
print("Convolution : \n", conv, "\n")
```

```
conv1 = np.fft.fft(xn1, N)  
print("Convolution lineaire de Xk1 : \n", conv1, "\n")
```

```
conv2 = np.fft.fft(xn2, N)  
print("Convolution lineaire de Xk2 : \n", conv2, "\n")
```