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**Batch: K5**

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clear all

clc

%Time reversal

x\_n = [ 1, 2, 1, 2]

X\_k = fft(x\_n)

N = 4;

xn\_p1 = circshift(fliplr(x\_n),[N,1])

X\_k\_p1 = fft(xn\_p1)

X\_k\_p1\_rhs = circshift(fliplr(X\_k),[N,1])

%Circular time shift

l=2;

xn\_p2 = circshift(x\_n, [N,l])

X\_k\_p2 = fft(x\_n);

X\_k\_p12 = fft(xn\_p2)

w = zeros(1,N);

for i = (1 : N)

w(i) = exp(-1i\*2\*pi\*(i-1)\*l/N);

end

X\_k\_p2\_rhs = (X\_k\_p2).\*(w)

%Circular frequency shift

z = zeros(1,N);

for i = (1 : N)

z(i) = exp(-1i\*2\*pi\*(i-1)\*l/N);

end

xn\_p3 = x\_n.\*z

X\_k\_p3 = fft(xn\_p3)

X\_k\_p3\_rhs = circshift(X\_k, [N,l])

**OUTPUT:**

x\_n =

1 2 1 2

X\_k =

6 0 -2 0

#TIME REVERSAL:

xn\_p1 =

1 2 1 2

X\_k\_p1 =

6 0 -2 0

X\_k\_p1\_rhs =

6 0 -2 0

#CIRCULAR TIME SHIFTING:

xn\_p2 =

1 2 1 2

X\_k\_p2 =

6 0 -2 0

X\_k\_p2\_rhs =

6.0000 + 0.0000i 0.0000 + 0.0000i -2.0000 - 0.0000i 0.0000 + 0.0000i

#CIRCULAR FREQUENCY SHIFTING:

xn\_p3 =

1.0000 + 0.0000i -2.0000 - 0.0000i 1.0000 + 0.0000i -2.0000 - 0.0000i

X\_k\_p3 =

-2.0000 - 0.0000i 0.0000 - 0.0000i 6.0000 + 0.0000i -0.0000 - 0.0000i

X\_k\_p3\_rhs =

-2 0 6 0