

A decorative graphic on the left side of the slide, consisting of a network of light blue lines and small circles, resembling a circuit board or a stylized tree structure, set against a dark blue background.

# DISCRETE TIME FOURIER TRANSFORM

**Perform the circular convolution of the following two sequences:**

$$x_1(n) = \{2, 1, 2, 1\}$$

↑

$$x_2(n) = \{1, 2, 3, 4\}$$

↑

1. Find the inverse fourier transform  
using convolution theorem

$$X(\Omega) = \frac{1}{(1 - ae^{-j\Omega})^2} \quad |a| < 1$$

2. Prove multiplication property

A causal discrete-time LTI system is described by

$$y[n] - \frac{3}{4}y[n-1] + \frac{1}{8}y[n-2] = x[n]$$

where  $x[n]$  and  $y[n]$  are the input and output of the system, respectively

- (a) Determine the frequency response  $H(\Omega)$  of the system.
- (b) Find the impulse response  $h[n]$  of the system.