

# DFS Tricks

I Determine  $c_k$  from  $x(n)$  which is a sum of sinusoids:

Use  $x(n) = \sum_{k=0}^{N-1} c_k e^{j \frac{2\pi}{N} kn}$  to identify  $c_k$ .

To facilitate this, we use the trick

$$\boxed{e^{-j \frac{2\pi}{N} kn} = e^{j \frac{2\pi}{N} (-k)n} = e^{j \frac{2\pi}{N} (N-k)n}}$$

II Determine  $x(n)$  from  $c_k$  which is a sum of sinusoids

Use  $c_k = \frac{1}{N} \sum_{n=0}^{N-1} x(n) e^{-j \frac{2\pi}{N} kn}$  to identify  $x(n)$

To facilitate this, we use the trick

$$\boxed{e^{j \frac{2\pi}{N} kn} = e^{-j \frac{2\pi}{N} k(-n)} = e^{-j \frac{2\pi}{N} k(N-n)}}$$