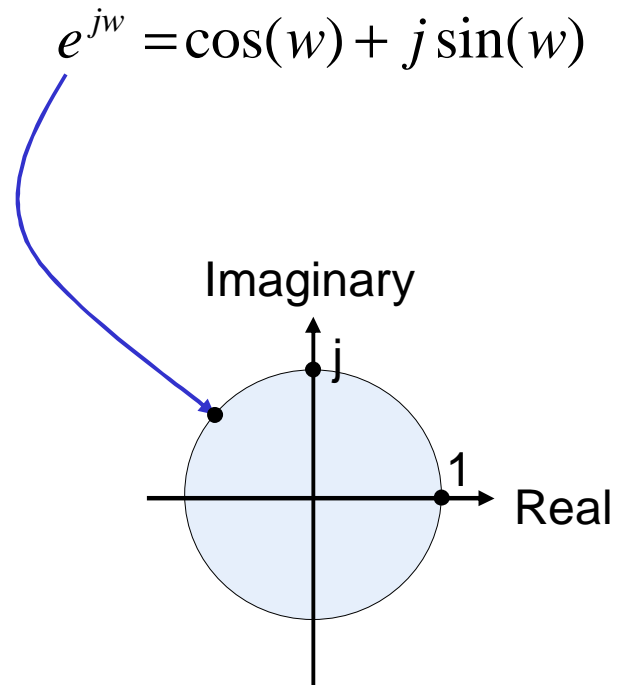


Discrete Fourier Transform



Hoon Yoo, Ph.D.

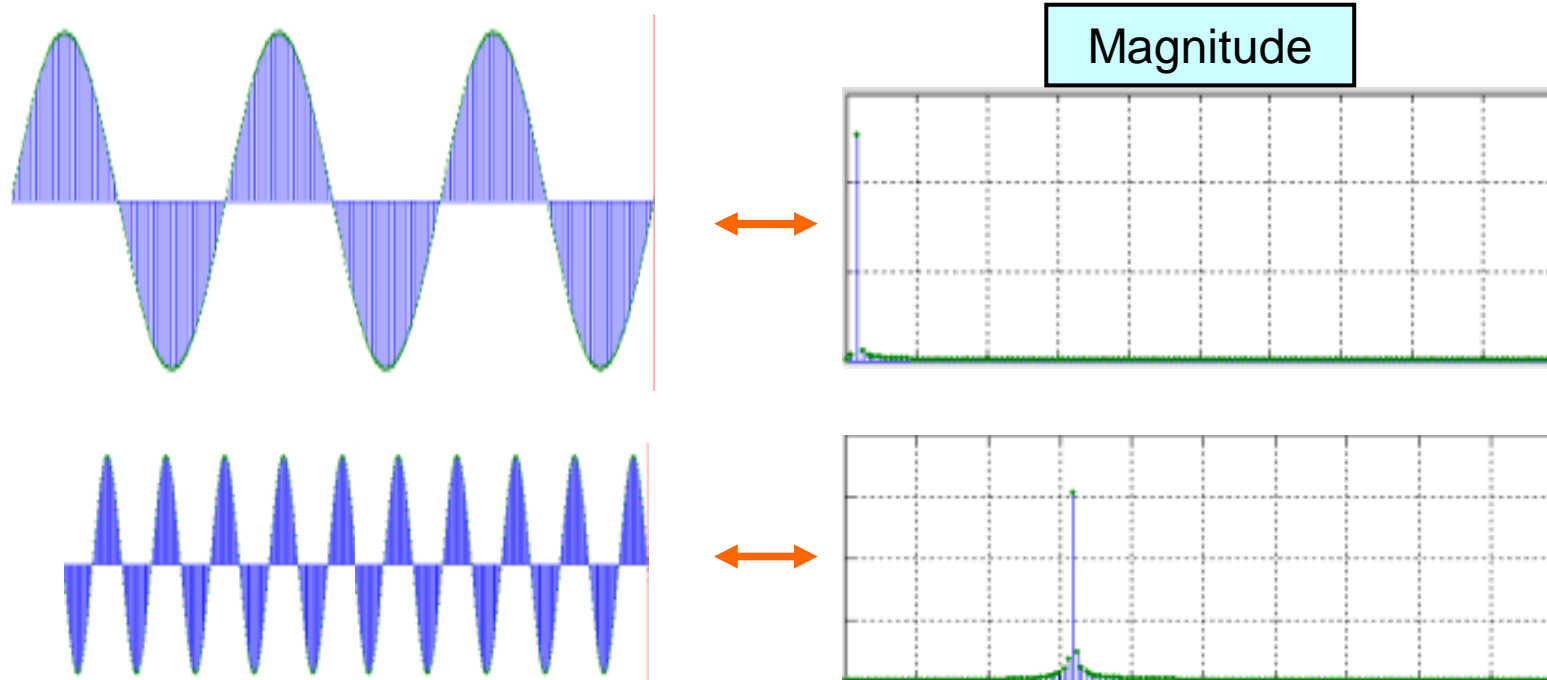
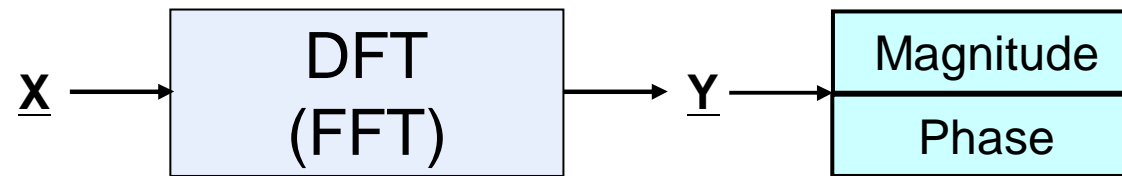
Euler's Formula



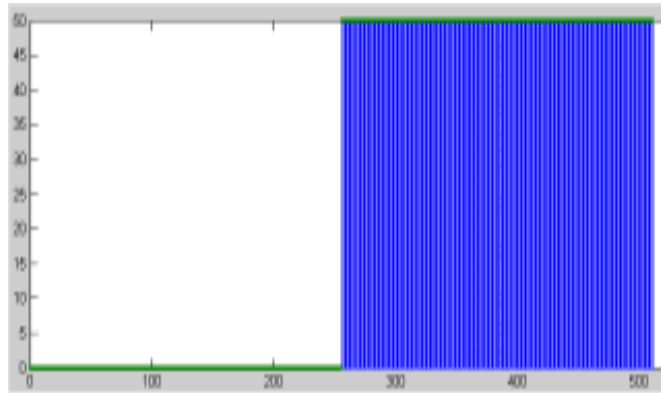
$$\cos(w) = \frac{e^{jw} + e^{-jw}}{2}$$

$$\sin(w) = \frac{e^{jw} - e^{-jw}}{2j}$$

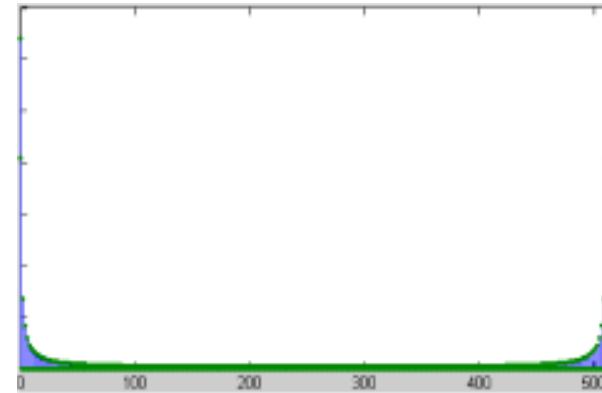
Discrete Fourier Transform



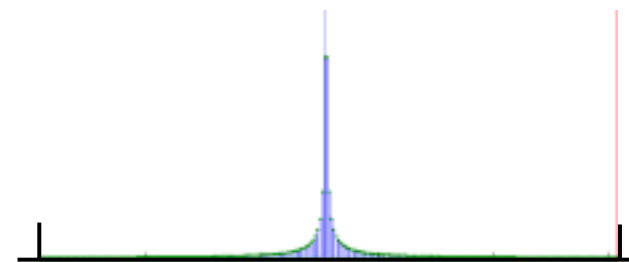
Discrete Fourier Transform



$X[0], x[1], \dots, x[510], x[511]$

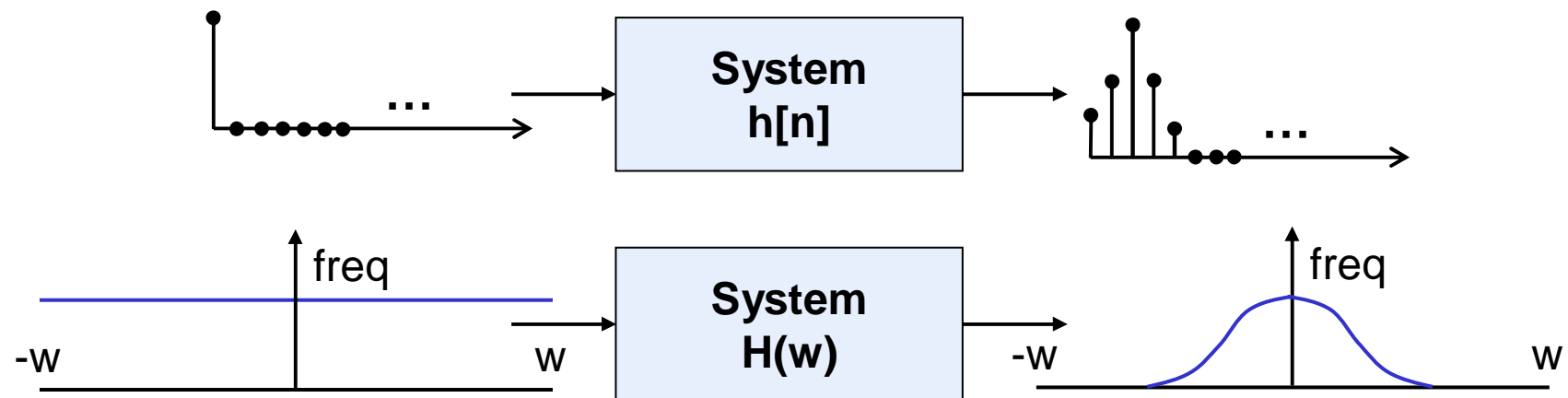
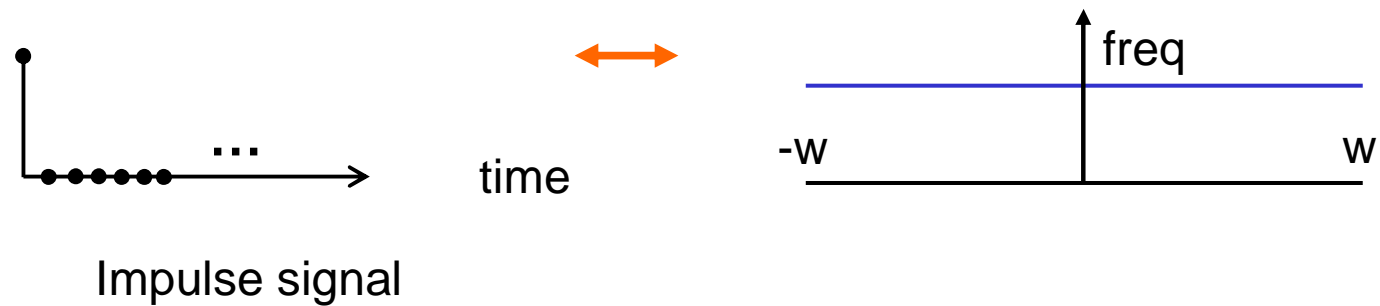


$C[0], C[1], \dots, C[255], C[256], \dots, C[510], C[511]$



$C[256], C[257], \dots, C[511], C[0], C[1], \dots, C[255]$

Discrete Fourier Transform



Summary

- DFT is a tool for analysis of spectral domain with discrete time signals
- The DFT of impulse signal is system response
- The DFT of sinusoidal signals is impulse signals in spectral domain