EE 331 – LECT. #2 JAN. 15, 2020

1. odd vs even funcs

$$f_e(-x) = f_e(x)$$

$$f_o(-x) = -f_o(x)$$

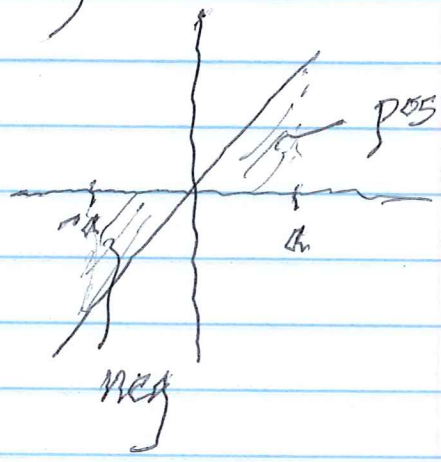
$$f_e(x) f_e(x) = f_e(x)$$

$$f_o(x) f_o(x) = f_e(x)$$

$$f_o(x) f_e(x) = f_o(x)$$

} identities

2. $$\int_{-a}^{a} f_o(x)\,dx = 0$$



3. euler's rule

$$e^{\pm jx} = \cos x \pm j \sin x$$

4. $$\sin x = \frac{e^{jx} - e^{-jx}}{j2} \qquad \cos x = \frac{e^{jx} + e^{-jx}}{2}$$

$$\sinh x = \frac{e^{x} - e^{-x}}{2} \qquad \cosh x = \frac{e^{x} + e^{-x}}{2}$$

5. use euler's rule to derive cos(x)

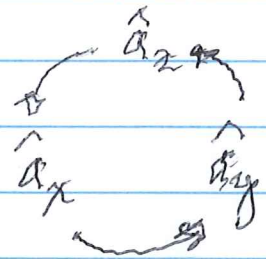
$$e^{\pm jx} = \cos x \pm j\sin x$$

$$e^{jx} = \cos x + j\sin x$$
$$e^{-jx} = \cos x - j\sin x$$

$$e^{jx} + e^{-jx} = 2\cos x + 0$$

$$\rightarrow \cos x = \frac{e^{jx} + e^{-jx}}{2}$$

6. unit vectors



eg. $\hat{a}_x \times \hat{a}_y = \hat{a}_z$

$\hat{a}_y \times \hat{a}_x = -\hat{a}_z$

↑ get vector

but $\hat{a}_y \cdot \hat{a}_y = 1$

$\hat{a}_x \cdot \hat{a}_x = 1$

$\hat{a}_z \cdot \hat{a}_z = 1$

$\hat{a}_x \cdot \hat{a}_y = 0$

$\hat{a}_x \cdot \hat{a}_z = 0$

7. simplify complex number

$$\frac{2+j3}{(2-j3)} \cdot \frac{2+j3}{(2+j3)}$$ ← complex conjugate of denom

$$= \frac{-5 + j12}{13}$$

$$= (2^2 + 3^2) = 13$$

8. phasor conversions:

$$V(z,t) = \underbrace{5e^{-0.2z}}_{\text{magn}} \cos(\underbrace{\omega t - 0.3}_{\text{phase}})$$

phasors shouldn't depend on t, for given ω, can use:

$$V_s(z) = 5e^{-0.2z} e^{-j0.3}$$

$$= 5e^{-0.2z - j0.3}$$