DSP HW 2

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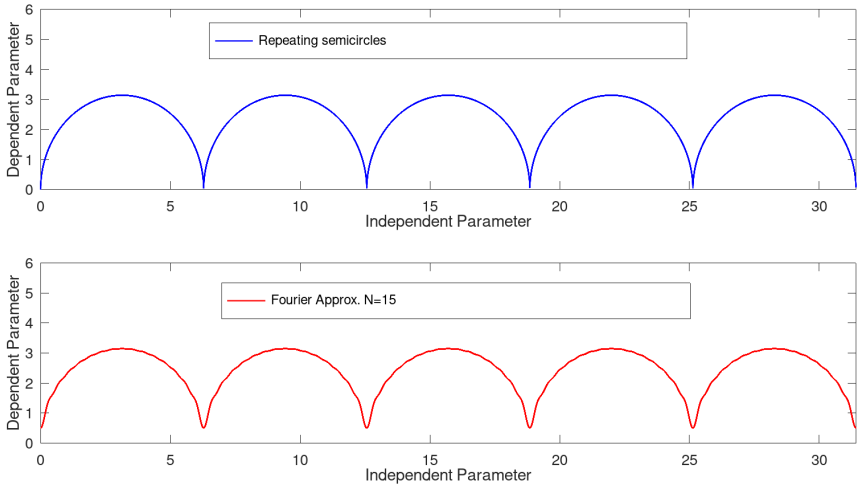
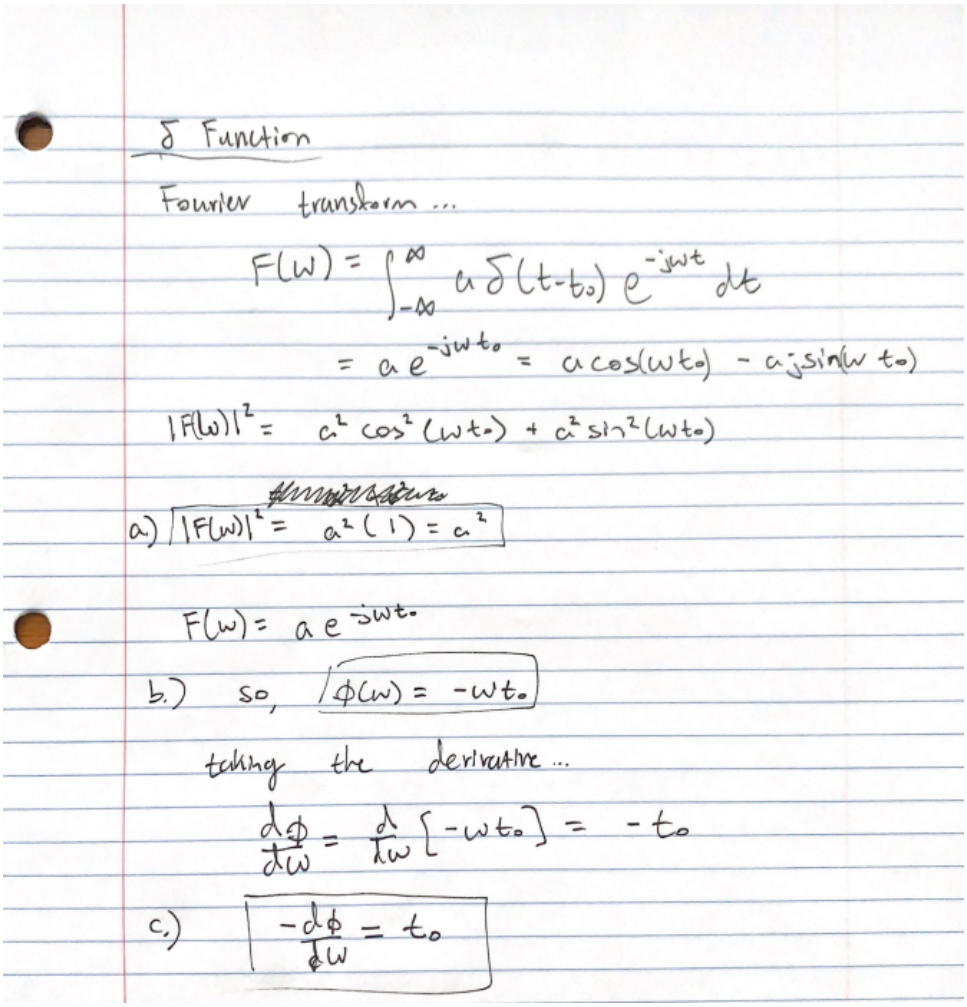
January 14, 2022

1. fourier_hw.m



2. Delta function



δ Function

Fourier transform ...

$$F(w) = \int_{-\infty}^{\infty} a\,\delta(t-t_0)\, e^{-jwt}\, dt$$

$$= a\, e^{-jwt_0} = a\cos(wt_0) - a\,j\sin(w\,t_0)$$

$$|F(w)|^2 = a^2\cos^2(wt_0) + a^2\sin^2(wt_0)$$

a) $\boxed{|F(w)|^2 = a^2(1) = a^2}$

$$F(w) = a\, e^{-jwt_0}$$

b.) so, $\boxed{\phi(w) = -wt_0}$

taking the derivative ...

$$\frac{d\phi}{dw} = \frac{d}{dw}\left[-wt_0\right] = -t_0$$

c.) $\boxed{\frac{-d\phi}{dw} = t_0}$