

ECE 340, Exam #1 Equation Sheet, Fall 2011

Sampling or Sifting Property of the Delta Function:

$$\int_{-\infty}^{\infty} x(t) \delta(t-T) dt = x(T)$$

Energy of a signal:

$$E_x = \int_{-\infty}^{\infty} |x(t)|^2 dt$$

Average power of a signal:

$$P_x = \lim_{T \rightarrow \infty} \frac{1}{T} \int_{-T/2}^{T/2} |x(t)|^2 dt$$

Convolution:

$$x(t) * h(t) = \int_{-\infty}^{\infty} x(\tau) h(t-\tau) d\tau = \int_{-\infty}^{\infty} h(\tau) x(t-\tau) d\tau$$

System Transfer Function:

$$H(s) = \int_{-\infty}^{\infty} h(\tau) e^{-s\tau} d\tau$$

Trigonometric Fourier Series:

$$x(t) = a_0 + \sum_{n=1}^{\infty} a_n \cos(n\omega_0 t) + \sum_{n=1}^{\infty} b_n \sin(n\omega_0 t)$$

$$a_0 = \frac{1}{T_0} \int_{T_0} x(t) dt$$

$$a_n = \frac{2}{T_0} \int_{T_0} x(t) \cos(n\omega_0 t) dt$$

$$b_n = \frac{2}{T_0} \int_{T_0} x(t) \sin(n\omega_0 t) dt$$

Exponential Fourier Series:

$$x(t) = \sum_{n=-\infty}^{\infty} D_n \exp(jn\omega_0 t)$$

$$D_n = \frac{1}{T_0} \int_{T_0} x(t) \exp(-jn\omega_0 t) dt$$