EECS 361- Spring 2025
Test 1 Topics

1) Complex numbers
2) Classification of signals
   a) Periodic
   b) Aperiodic
   c) Energy
   d) Power
   e) Continuous time
   f) Discrete time
   g) Deterministic
   h) Random
3) Time scaling, x(at), and time shifting x(t +/- T) signals
4) Phasor representation of $\cos(2\pi f_o t)$ & Spectral plots for $A\cos(\omega_0 t+\phi)$ or $A\cos(2\pi f_o t+\phi)$ and $\Sigma\, A_n\cos(2\pi n f_o t+\phi_n) = \Sigma\, A_n\cos(n\omega_o t+\phi_n)$
5) Calculation of the Energy and Power of Signals & Power in $A\cos(\omega_0 t+\phi)$ or $A\cos(2\pi f_o t+\phi)$
6) Special functions
   a) $\delta(t)$
   b) tri(t)
   c) u(t)
   d) rect(t)
   e) r(t)
7) Classification of Systems
   a) Linear/Nonlinear
   b) Time Varying/Time invariant
   c) Causal/Noncausal
   d) Continuous time/ Discrete time
   e) BIBO stable
   f) Linear and Time Invariant (LTI) System
8) Convolution & its properties in continuous time
9) Impulse response h(t)
10) Step response $y_{Step}(t)$
11) Impulse response of cascaded linear time invariant systems
12) Bounded input/Bounded output (BIBO) stability and the impulse response - h(t)
13) Causality and the impulse response - h(t)
14) Transfer Function of linear time invariant systems – $H(\omega)$ or H(f)
15) Response of a linear time invariant systems with Transfer Function $H(\omega)$ or H(f) to an input signal of $A\cos(\omega_0 t+\phi)$ or $A\cos(2\pi f_o t+\phi)$ or $\Sigma\, A_n\cos(n\omega_o t+\phi_n)$
16) Model periodic signals using Fourier Series
   a) Complex exponential form, $\mathbf{x}_n$'s
   b) Sine/Cosine form, a_n's and b_n's
   c) Cosine form c_n's
   d) Determine the fundamental frequency of periodic signals
   e) Determine DC (average value, $\mathbf{x}_0$, a_0, c_0) of periodic signal
   f) Apply signal symmetry properties to simplify finding an's, b_n's, c_n's, $\mathbf{x}_n$'s
   g) Time →Frequency & Frequency→Time; x(t)→ Magnitude and two-sided spectral plots and Magnitude and two-sided spectral plots →x(t)
   h) $\Sigma\, x((t-kT_0)/\tau)$ the spectral lines separated by $1/T_0$ and the envelope is related to τ.