EECS 360
Semester Review

1) Classification of signals:
   a) Periodic
   b) Aperiodic
   c) Energy
   d) Power
   e) Continuous time
   f) Discrete time
   g) Deterministic
   h) Random
2) Phasor representation of sin & cos and complex numbers, magnitude and phase
3) Classification of Systems
   a) Linear/Nonlinear
   b) Time varying/Time invariant
   c) Causal/non-causal
   d) Continuous time/Discrete time
4) Special functions
   a) $\delta(t)$
   b) $\Lambda(t)$
   c) $u(t)$
   d) $\pi(t)$
5) Convolution
   a) Continuous time
   b) Discrete time
6) Impulse response of linear time invariant systems, h(t)
7) Step response of systems a(t)
8) Impulse response of cascaded linear time invariant systems, h(t) and h(n).
9) Bounded input/Bounded output stability and constraints on h(t) and h(n) for stability
10) Causality and constraints on h(t) for stability
11) Fourier Series
   a) Complex exponential
   b) Sin/Cos
   c) Cos
12) Power-Parsaval's theorem
13) Spectral plots for periodic signals: one sided and double sided
14) Fourier Transform
15) Fourier Transform theorems and properties
16) Energy-Parsaval's theorem for aperiodic signals
17) Transfer Function of linear time invariant systems -H(f)
18) Amplitude and phase response of linear time invariant systems, $H(\omega)$ and H(z).
19) Transfer Function of cascaded linear time invariant systems

20) Criteria for an ideal linear time invariant systems
    a) ILPF
    b) IBPF
21) Distortion for linear time invariant systems
    a) Amplitude distortion
    b) Phase distortion
22) Distortion for non-linear time or time varying systems-Total Harmonic distortion
23) Signals and systems
    a) Impact of systems on signals
    b) Bandwidth and its definitions
    c) Inverse time duration-bandwidth relationship
    d) Inverse rise time and bandwidth relationship
    e) If $B_h >> B_s$ then minimal distortion,
       where B_h=system bandwidth and B_s=signal bandwidth
24) Sampling theorem
    a) Minimum sample rate
    b) Spectrum of a sampled signal
    c) Aliasing
25) Discrete Fourier Transform
    a) Definition
    b) DFT is the Fourier Series of a periodic sampled (discrete) signal
    c) Parameters of the DFT, frequency resolution, record length, and sample rate
    d) Picket fence effect
    e) Spectral leakage
    f) Circular convolution
26) Z-Transform and digital filters
    a) Definition
    b) Frequency response is H(z) evaluated on the unit circle
    c) Properties of Z-transforms
        Linearity
        Delay
        Multiplication by a^n
        Multiplication by k
        Convolution
    d) Poles and zeros for the general difference equation
    e) Relationship of pole and zero locations to the frequency response
    f) Analysis-given the general difference equation find:
        Location of poles and zeros
        Frequency response
    g) Design of digital filters
        Position the poles and zeros in the z-plane to get desired freq. response
        Form H(z)
        Determine the coefficients for the difference equation
    h) All poles of H(z) must be inside the unit circle for the system to be stable