Date/Time/Room: M 05/08/2000 from 06:00pm-09:00pm in Weir 208

Items Allowed During Exam:

- One 8.5" x 11" sheet of paper with writing on both sides.
- Writing utensils, erasers, and calculators.

Items Provided During Exam:

- Continuous-time Fourier Transform properties and pairs from textbook.
- Z-transform properties and pairs tables from textbook.
- Integral and summation tables from textbook.

Potential Topics:

1. DT Signals
   - construction via sampling CT signal
   - sampling theorem, Nyquist sampling rate
   - ideal and practical sampling results (time, frequency, and reconstruction)
   - time and frequency relationships between CT signal, ideally sampled signal, and practically sampled signal
   - common signal definitions ($\delta(t)$, $\delta[k]$, $u(t)$, $u[k]$, $rect(t/W)$, $rect[k/W]$)
   - periodicity test, nonuniqueness of DT sinusoids, combination signals (time-scaling, time-shifts, etc.)

2. DT Systems
   - difference equation model (discretize differential equation, solve via recursion or z-transform, construct from TF, solve for zero-state and zero-input responses)
   - transfer function model (DTFT or ZT, construct from difference equation, solve for zero-state response given TF and input, use to characterize system)
   - convolution sum model (solve for zero-state response via sum)
   - system properties (causal, linear, time-invariant)

3. DTFT
   - $f[k] \Leftrightarrow F(\Omega)$
   - plot and interpret magnitude and phase spectra plots

4. DFT
   - $f[k] \Leftrightarrow F_r$
   - plot and interpret magnitude and phase spectra plots
   - relate to DTFT and CTFT (including effects of aliasing and time-truncation)
   - basics of FFT algorithm

5. ZT
   - $f[k] \Leftrightarrow F[z] \Leftrightarrow F(\Omega)$
   - solve for system outputs given difference equations with initial conditions, convolution model, or TF; characterize system via TF

6. Digital Filtering
   - bilinear transformation
   - simple filter design

7. DSP System
   - anti-aliasing filter, sampling, reconstruction (methods and anti-imaging filter), DFT for frequency information