

## Final Exam Review Sheet

The exam will cover the following topics. You can bring one sheet of handwritten notes to the exam. No textbooks, class notes or homework solutions are allowed. You may use a calculator. The exam will be in class on Monday, December 9, 12:45-2:45pm and will be 2 hours long.

### I. Signals (Chapter 2 and 3) concentrate on discrete-time signals

- Operations on Signals
- Energy vs. Power signals, Periodic vs. non-periodic, Even and odd signals
- Harmonic Signals and Sinusoids
- Special Signals (Impulse, Unit step, Ramp, Rectangle, Triangle)
- **Sampling Theorem**

### II. Systems (Chapter 4 ,5, 6 and 7) concentrate on discrete-time systems

- System classification (Linear, Time-Invariant, Causal, Static, Stable)
- LTI systems described by differential equations/difference equations.
- Time domain analysis of LTI systems
- Finding zero-state response of systems in the time domain: **Impulse response and convolution**

### III. Frequency Domain Analysis of Signals and Systems (Chapter 8,9,11 and 17)

- Laplace Transform
  - Definition and properties
  - Inverse Laplace transform
  - Transfer function
  - Poles, zeros and stability
  - Laplace transform and system analysis (Circuit analysis, Steady-state response)
- **Fourier Series**
  - Exponential, Trigonometric and Polar Form
  - Spectrum of Periodic signals
  - System Response to periodic inputs
- **Fourier Transform**
  - Definition and properties
  - Inverse Fourier Transform
  - System Analysis Using Fourier Transform (Steady-state response, frequency response of systems)
  - Applications of Fourier transform: **Filtering, Sampling and Modulation**
- **Z-transform**
  - Definition and properties
  - Region of Convergence
  - Inverse z-transform
  - Transfer function
  - Poles, zeros and stability
  - Frequency Response and steady-state analysis using z-transform