Exam 1 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, February 24 and will be 50 minutes long.

I. **Linear Modulation (Chapter 3.1)**
   - Double Sideband Modulation
     1. Modulation System
     2. Spectrum
     3. Demodulation System (Coherent Demodulation)
   - Amplitude Modulation
     1. Modulation System
     2. Spectrum
     3. Demodulation System (Envelope Detection)
   - Single Sideband Modulation
     1. Modulation System (Phase-shift Modulator)
     2. Hilbert transform
     3. Spectrum
     4. Demodulation System (Coherent Demodulation or Carrier Reinsertion)
   - Vestigial Sideband Modulation
     1. Modulation System
     2. Vestigial sideband filter
     3. Spectrum
     4. Demodulation System (Carrier Reinsertion)

II. **Angle Modulation (Chapter 3.2)**
   - Definition of PM and FM
   - Narrowband Angle Modulation
   - Spectrum of Angle Modulated Signal
     1. Tone Modulation
     2. Bessel functions
     3. Effective Bandwidth
   - Power and Bandwidth of Angle Modulated Signals
   - Modulation Systems
     1. Direct FM (VCO)
     2. Indirect FM (Narrowband-to-Wideband Conversion)
     3. Application: Armstrong type FM Radio Transmitter
   - Demodulation Systems (Discriminator, FM-AM converter)