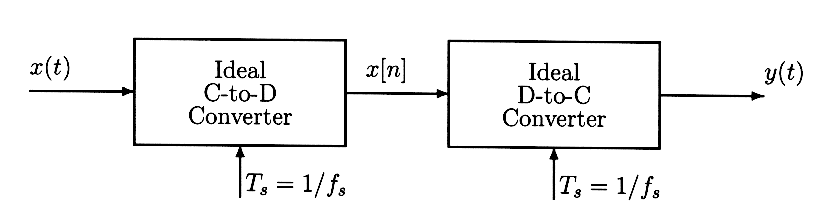
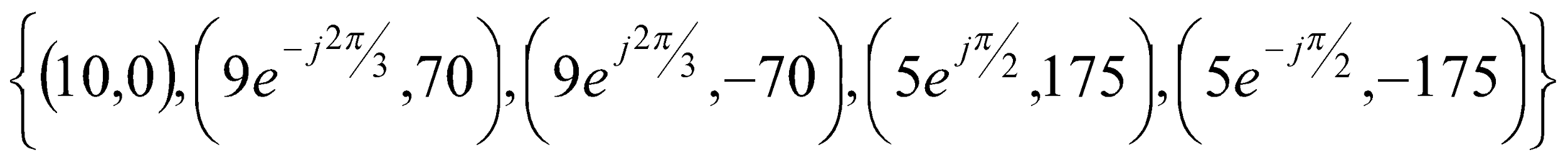
***Seminar 5: Sampling***

1. Consider the system



If , what condition has to be satisfied for the sampling frequency , so that y(t) = x(t)?

1. Given a signal
   1. Draw a sketch of the spectrum of , labelling the frequencies and complex amplitudes of each component.
   2. Determine the minimum sampling rate that can be used to sample without any aliasing.
2. Suppose that a discrete signal was obtained sampling a continuous signals with a sampling frequency samples/sec.
   1. Determine two continuous signals and so that for T =.0002 sec. The two signals have to have a frequency smaller than 5000 Hz. Give an equation for each signal.
   2. Determine the amplitude and phase of the two signals obtained in section (a).
3. A signal *x(t)* has the following spectral representation:



* 1. Write an equation for *x(t)*.
  2. The signal *x(t)* is sampled with a sampling frequency samples/sec to obtain a discrete signal . Write an equation for *x*[*n*] and draw the spectrum of *x*[*n*] for normalized frequencies .

1. A chirp signal can be synthesized using the following formula:
2. Draw the phasor for the three cases n = 10, 100, 1000
3. If the signal goes through an D-A converter with a sampling frequency of 4kHz, draw the instantaneous analog frequency (in Hz) with respect to time. Make sure that the coordinates are drawn correctly.
4. Given a signal , the corresponding discrete signal is obtained sampling with a frequency ; and the resulting x[n] can be written as . Determine the values of and for each of the following values of
   1. 10
   2. 25
   3. 15
5. The following complex-valued signal is a phasor: , where is the phase.
   1. When the phase changes by a constant amount versus n, the phasor rotates at a constant speed. For the following phasor: , make a plot of the phasor locations for
   2. What is the period of ?
   3. Repeat for the complex phasor that corresponds to the chirp signal: . In this case plot the phasor locations for