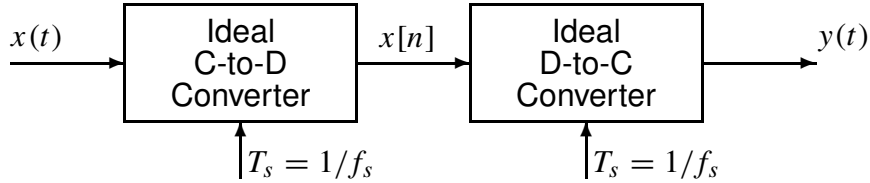
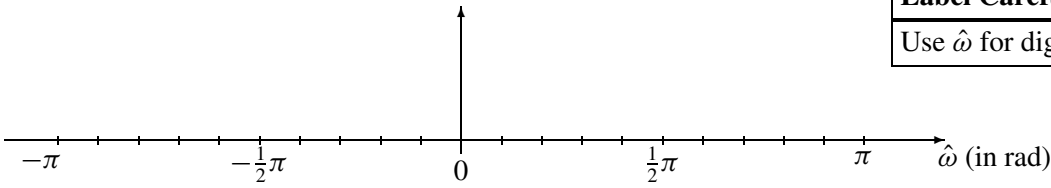
PROBLEM:



(a) If the input to the ideal C/D converter is $x(t) = 3\cos(6000\pi t - \pi/4)$, determine the spectrum for $x[n]$ when $f_s = 4000$ samples/sec. Make a plot for your answer, but label the frequency, amplitude and phase of each spectral component.

Label Carefully

Use $\hat{\omega}$ for digital freq.



(b) Suppose that the input signal is a chirp signal defined as follows:

$$x(t) = \cos(2\pi(1000)t - 500\pi t^2) \qquad \text{for } 0 \le t \le 10 \text{ sec.}$$

If the sampling rate is $f_s = 4000$ Hz, then the output signal $y(t)$ will have time-varying frequency content. Draw a graph of the resulting analog *instantaneous* frequency (in Hz) versus time of the signal $y(t)$ **after reconstruction.** Recall that this could be done in MATLAB by putting a sampled chirp signal into the MATLAB function `specgram()`, or the SP-First function `plotspec()`.