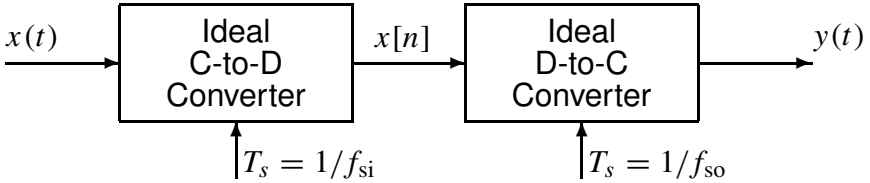
**PROBLEM:**

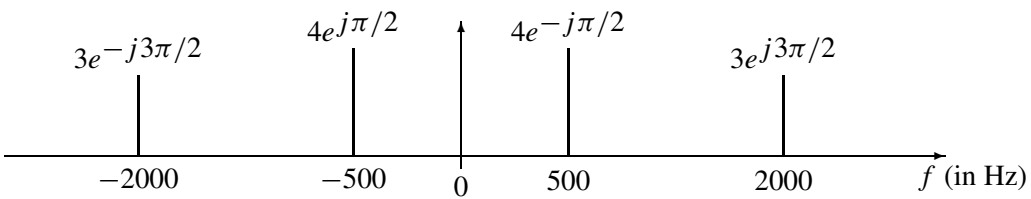



(a) Suppose that the discrete-time signal $x[n]$ is given by the formula

$$x[n] = 10\cos(0.20\pi n - \pi/3)$$

If the sampling rate of the C-to-D converter is $f_{\text{si}} = 1500$ samples/second, many *different* continuous-time signals $x(t) = x_\ell(t)$ could have been inputs to the above system. Determine two such inputs with frequency less than 1500 Hz; i.e., find $x_1(t)$ and $x_2(t)$ such that $x[n] = x_1(nT_{\text{si}}) = x_2(nT_{\text{si}})$ if $T_{\text{si}} = 1/1500$.

(b) If the input $x(t)$ is given by the two-sided spectrum representation shown below,




Determine the spectrum for $x[n]$ when $f_{\text{si}} = 1500$ samples/sec. Make a plot for your answer, but label the frequency, amplitude and phase of each spectral component.

(c) Using the discrete-time spectrum from part (b), determine the analog frequency components in the output $y(t)$ when the sampling rate of the D-to-C converter is $f_{\text{so}} = 900$ Hz. In other words, the sampling rates of the two converters are different.