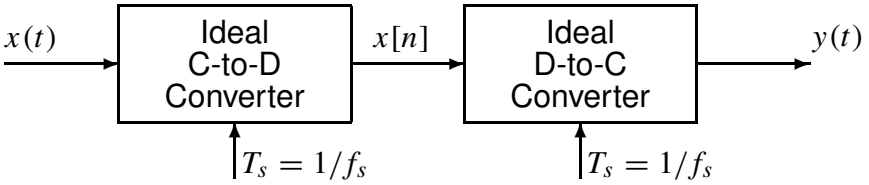
PROBLEM:

Again consider the ideal sampling and reconstruction system

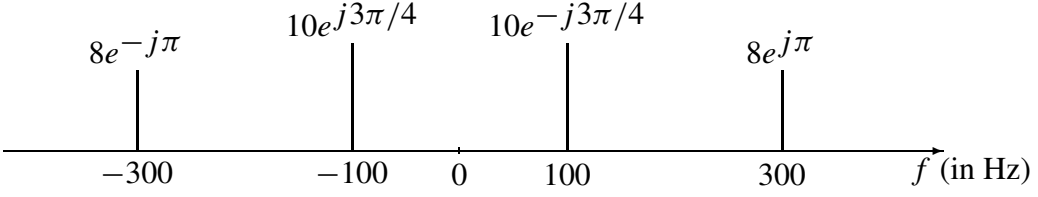


(a) Suppose that the discrete-time signal $x[n]$ in the figure above is given by the formula

$$x[n] = 4\cos(0.3\pi n - \pi/3)$$

If the sampling rate of the C-to-D converter is $f_s = 10000$ 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 10000 Hz; i.e., find $x_1(t) = A_1\cos(\omega_1 t + \phi_1)$ and $x_2(t) = A_2\cos(\omega_2 t + \phi_2)$ such that $x[n] = x_1(nT_s) = x_2(nT_s)$ if $T_s = 1/10000$ secs.

(b) Now if the input $x(t)$ to the system in the figure above has the two-sided spectrum representation shown below,what is the *minimum* sampling rate f_s such that the output $y(t)$ is equal to the input $x(t)$?



(c) Determine the spectrum for $x[n]$ when $f_s = 300$ samples/sec. Make a plot for your answer, but label the frequency, amplitude and phase of each spectral component.