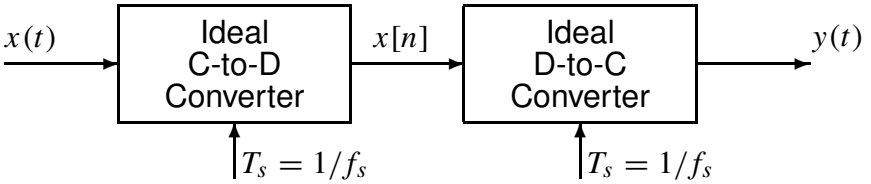
PROBLEM:

Consider the following system.



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

$$x[n] = 27\cos(0.11\pi n - \pi/3)$$

If the sampling rate is $f_s = 5000$ samples/second, determine two *different* continuous-time signals $x(t) = x_1(t)$ and $x(t) = x_2(t)$ that could have been inputs to the above system; i.e., find $x_1(t)$ and $x_2(t)$ such that $x[n] = x_1(nT_s) = x_2(nT_s)$ if $T_s = 200$ μsec. Both of these input signals should have a frequency less than 5000 Hz. Give a formula for each signal.

(b) If the input $x(t)$ is given by the two-sided spectrum representation shown below, determine a simple formula for $y(t)$ when $f_s = 5000$ samples/sec. (for both the C/D and D/C converters).