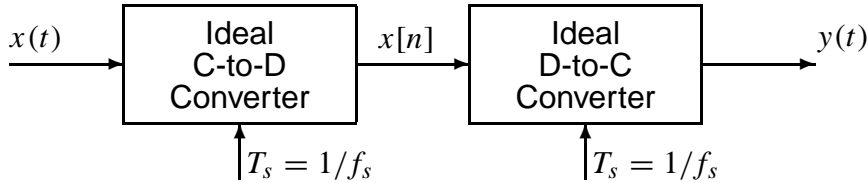


## PROBLEM:

Consider the following system.



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

$$x[n] = 10 \cos(0.18\pi n + \pi/4)$$

If the sampling rate is  $f_s = 2500$  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  $T_s = 1/2500$ . Both of these input signals should have a frequency less than 2500 Hz. Give a formula for each signal.

- (b) For  $x[n]$  given in part (a), what is the frequency of the analog signal  $y(t)$  that will be reconstructed by the ideal D-to-C converter operating at sampling rate 2500 samples/second?
- (c) If the input  $x(t)$  is given by the two-sided spectrum representation shown below, determine a simple formula for  $y(t)$  when  $f_s = 2500$  samples/sec. (for both the C/D and D/C converters).

