

PROBLEM:

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

$$x[n] = 5 \cos(0.4\pi n - \pi/4)$$

and that it was obtained by sampling a continuous-time signal at a sampling rate of $f_s = 1/T_s = 500$ samples/second.

- (a) Determine two *different* continuous-time signals $x_1(t)$ and $x_2(t)$ whose samples are equal to $x[n]$; i.e., find $x_1(t)$ and $x_2(t)$ such that $x[n] = x_1(nT_s) = x_2(nT_s)$ if $T_s = 1/500 = 0.002$. Both of these signals should have a frequency less than 500 Hz. Give a formula for each signal.
- (b) If $x[n]$ is given by the equation above, what signal will be reconstructed by an ideal D-to-C converter operating at sampling rate $f_s = 500$ samples/second? That is, what is the output $y(t)$ in the following figure if $x[n]$ is as given above?

