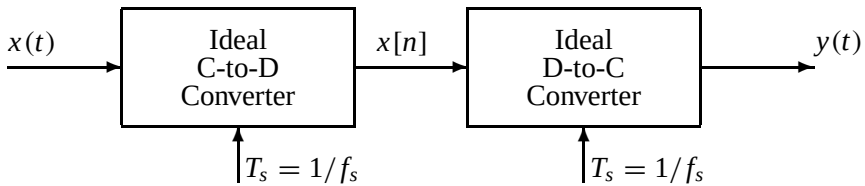
PROBLEM:

Consider the ideal C-D and D-C converter shown in the figure below.



(a) If the Fourier transform of the input $X(j\omega)$ is equal to zero for $|\omega| > 1000\pi$, what is the largest value for the sampling period T_s that can be used with no aliasing?

$T_s =$

(b) If $x[n] = 3\cos(0.3\pi n + \pi/6)$, and the sampling frequency is $f_s = 2000$ Hz, find the signal $x(t)$ that would produce the given $x[n]$, and that would produce an output of the D-C converter such that $y(t) = x(t)$.

(c) If $x(t) = \mathrm{Re}\left\{1 + \frac{1}{2}e^{-j(1500\pi t)} + \frac{1}{4}e^{j(5000\pi t)}\right\}$, what is the Nyquist rate? **Note: Your answer should be expressed in Hertz.**

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