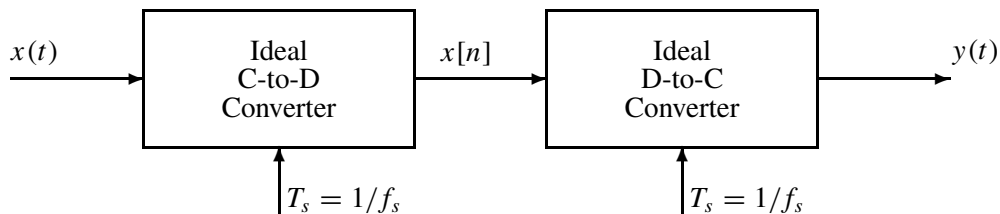## PROBLEM:

Consider the following sampling and reconstruction system.

where $x[n] = x(nT_s)$. In the rest of this problem, assume that $x(t)$ is given by the formula

$$x(t) = 10\cos(10\pi t) + 2\cos(40\pi t + \pi/3)$$

(a) What condition must be satisfied by the sampling rate, $f_s = 1/T_s$, such that $y(t) = x(t)$?

(b) Now suppose that $f_s = 20$ samples/sec. Below, sketch the spectrum of the sampled signal $x[n]$ (i.e., show the alias frequencies) as a function of both cyclic frequency for $-f_s < f < f_s$ and normalized frequency $\hat{\omega} = 2\pi f T_s$ for normalized frequencies $-2\pi < \hat{\omega} < 2\pi$. *Label the axis carefully.*

-2π	$-\pi$	0	π	2π	$\hat{\omega}$
-20	-10	0	10	20	f
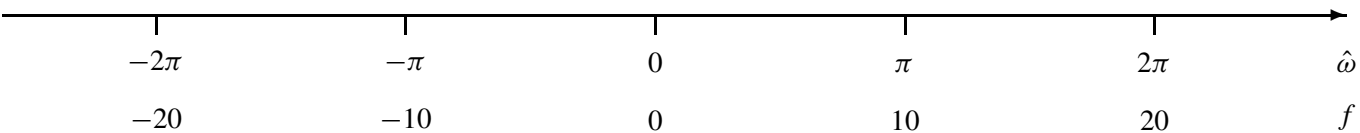
(c) What is the output $y(t)$ if the sampling rate is $f_s = 20$ samples/second as in part(c)?