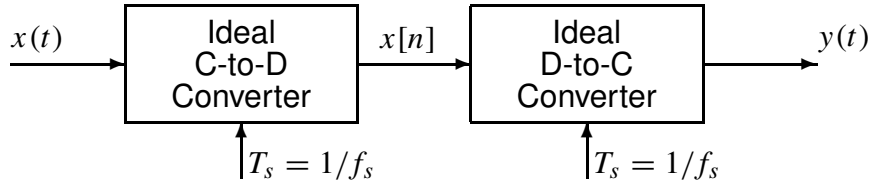
PROBLEM:



(a) A continuous-time signal $x(t)$ is defined by the following formula: $x(t) = \sum_{k=-5}^{5} j\pi k\, e^{j120\pi kt}$ Determine the Nyquist rate for sampling $x(t)$; give your answer answer in Hz or in samples per second.

$f_s =$ Hz

(b) A chirp signal is defined as follows:

$$x(t) = \cos(2\pi(500 + 500t)t) \qquad \text{for } 0 \le t \le 2 \text{ sec.}$$

If the sampling rate is $f_s = 2000$ Hz, then the output signal $y(t)$ will have time-varying frequency content. Draw a graph of the resulting analog *instantaneous* frequency (in Hz) versus time of the signal $y(t)$ **after reconstruction.** Hint: this is similar to the laboratory exercise of putting the sampled chirp signal into the MATLAB function `specgram()`.