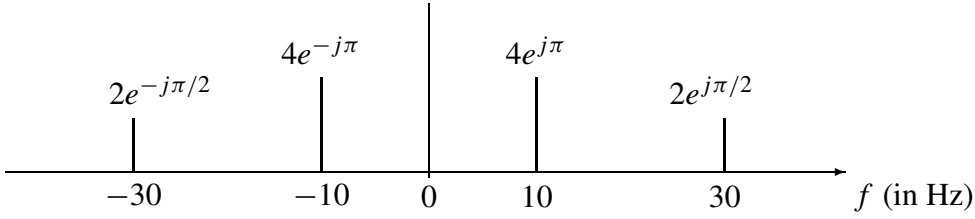
PROBLEM:

A signal $x(t)$ has the two-sided spectrum representation shown below.



(a) Write an equation for $x(t)$. Make sure to express $x(t)$ as a real-valued signal.

(b) If the signal is sampled at a rate of $f_s = 40$ Hz, sketch the "digital" spectrum of this signal. Indicate the complex phasor value at each frequency. Only the range $-\pi < \hat{\omega} \leq \pi$ needs to be shown.

(c) If the length-3 FIR filter (below) has filter coefficients $\{b_k\} = \{1, b_1, 1\}$, show that $b_1 = -2\cos(0.5\pi)$ will make the output signal $y[n]$ equal to zero.