Question #1:   Consider the discrete-time Fourier transform response

$$Z(\omega) = j \sum_{k=-\infty}^{\infty} u(\omega + \pi/2 - 2\pi k) - 2u(\omega - 2\pi k) + u(\omega - \pi/2 - 2\pi k)$$

(a) Sketch the magnitude of $Z(\omega)$ (i.e., $|Z(\omega)|$) for $-4\pi \leq \omega \leq 4\pi$.

(b) Sketch the phase $Z(\omega)$ (i.e., $\angle Z(\omega)$) for $-4\pi \leq \omega \leq 4\pi$.

(c) Is this an FIR filter or an IIR filter?

(d) Would you describe $Z(\omega)$ as a low pass filter, band pass filter, high pass filter, or none?

Question #2: Consider the discrete-time difference equation

$$y[n] = y[n-3] - x[n]$$

(a) Determine the transfer function $H(z)$ for the system.

(b) Determine the frequency response $H(\omega)$ for the system.

(c) Compute and sketch the magnitude of $H(\omega)$ (i.e., $|H(\omega)|$) for $-\pi \leq \omega \leq \pi$.

(d) Compute and sketch the phase $H(\omega)$ (i.e., $\angle H(\omega)$) for $-\pi \leq \omega \leq \pi..$

(e) Is this an FIR filter or an IIR filter?

(f) Would you describe this filter as a low-pass, band-pass, high-pass, or none-of-the-above filter?