## PROBLEM:

A linear time-invariant filter is described by the difference equation

$$y[n] = (x[n] + x[n-1] + x[n-2])/3$$

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

(b) Plot the poles and zeros of $H(z)$ in the $z$-plane.

(c) From $H(z)$, obtain an expression for $H(\hat{\omega})$, the frequency response of this system.

(d) Sketch the frequency response (magnitude and phase) versus frequency for $-\pi \leq \hat{\omega} \leq \pi$.

(e) What is the output if the input is

$$x[n] = 4 + \cos[0.25\pi(n-1)] - 3\cos[(2\pi/3)n]$$

*See answers at the end of this problem set.*