4. An FIR filter of length 5 is defined by a symmetric impulse response; that is $h[n] = h[4-n], 0 \leq n \leq 4$. Let the input to this filter be a sum of three cosine sequences of angular frequencies: 0.2 rad/samples, 0.5 rad/samples, and 0.8 rad/samples, respectively. Determine the impulse response coefficients so that the filter passes only the midfrequency component of the input.

5. For an LTI system described by the difference equation:

$$\sum_{k=0}^{N} a_k y[n-k] \quad = \quad \sum_{k=0}^{M} b_k x[n-k]$$

The frequency response is given by:

$$H\left(e^{j\omega}\right) \quad = \quad \frac{\sum_{k=0}^{M} b_k e^{-j\omega k}}{\sum_{k=0}^{N} a_k e^{-j\omega k}}.$$

Write a Matlab function called "`freqresp`" to compute the above frequency response. The format of the function should be:

```
function [H] = freqresp( b, a, omega )
% Computes the frequency response of the system defined by the
% difference equation coefficients contained in the vectors b and a
% at every frequency in the sampled frequency vector "omega"
% Usage: [H] = freqresp( b, a, omega )
%         H = the frequency response computed at the frequencies in omega
%         b = the feedforward difference equation coefficients
%         a = the feedback difference equation coefficients
%         omega = the sampled frequency axis
```

Use this function to compute the frequency response $H\left(e^{j\omega}\right)$ of the following systems over $0 \leq \omega \leq \pi$. For each frequency response, use the `subplot` command to plot the dB magnitude response $20\log_{10}|H\left(e^{j\omega}\right)|$ in one subplot and the unwrapped phase response $\angle H\left(e^{j\omega}\right)$ in another subplot.

(a) $y[n] = \frac{1}{5}\sum_{k=0}^{4} x[n-k]$.

(b) $y[n] = x[n] - x[n-2] + 0.95y[n-1] - 0.9025y[n-2]$.

(c) $y[n] = x[n] - x[n-1] + x[n-2] + 0.95y[n-1] - 0.9025y[n-2]$.

(d) $y[n] = x[n] - 1.7678x[n-1] + 1.58625x[n-2] + 1.1314y[n-1] - 0.64y[n-2]$.

(e) $y[n] = x[n] - \sum_{k=1}^{5}(0.5)^k y[n-k]$.

Include all of your Matlab code with your plots. The Matlab code and plots must be your own work (turning in someone else's code and/or plots is an honor code violation).