

## PROBLEM:

The intention of the following MATLAB program is to filter a sinusoid via the `conv` function.

```
omega = pi/6;  
nn = [ 0:300 ];  
xn = cos(omega*nn - pi/4);  
bb = [ 2 0 0 -2 ];  
yn = conv( bb, xn );
```

(a) Determine  $H(z)$  and also the zeros of the FIR filter.

(b) Determine a formula for  $y[n]$ , the signal contained in the vector  $\underline{y}_n$ . Give the individual values for  $n = 0, 1, 2$ , and then provide a general formula for  $y[n]$  that is correct for  $3 \leq n \leq 300$ . This formula should give numerical values for the amplitude, phase and frequency of  $y[n]$ .

(c) Give a value of  $\omega$  such that the output is guaranteed to be zero, for  $n \geq 3$ .