



PROBLEM:

Determine the numerical values that will be contained in the HH vector when MATLAB computes the frequency response via:

```
bb = [1, 2]; aa = [1, 0.5]; HH = freqz( bb, aa, [0, pi/2, pi, 5*pi/4] )
```

Give your answer in polar form.



Determine the numerical values that will be contained in the HH vector when MATLAB computes the frequency response via:

$$\text{bb} = [1, 2]; \text{aa} = [1, 0.5]; \text{HH} = \text{freqz}(\text{bb}, \text{aa}, [0, \pi/2, \pi, 5\pi/4])$$

Give your answer in polar form.

$$H(z) = \frac{1 + 2z^{-1}}{1 + \frac{1}{2}z^{-1}} \Rightarrow H(e^{j\hat{\omega}}) = \frac{1 + 2e^{-j\hat{\omega}}}{1 + \frac{1}{2}e^{-j\hat{\omega}}}$$

The freqs are $\hat{\omega} = 0, \pi/2, \pi, 5\pi/4$

$$H(e^{j0}) = \frac{1+2}{1+1/2} = \frac{3}{1.5} = 2 \quad H(e^{j\pi}) = \frac{1-2}{1-1/2} = \frac{-1}{1/2} = -2 = 2e^{j\pi}$$

$$H(e^{j\pi/2}) = \frac{1-j2}{1-j1/2} = 2 \frac{1-j2}{2-j} = 2e^{-j0.205\pi} \quad \leftarrow -0.644 \text{ rads}$$

$$H(e^{j5\pi/4}) = \frac{1+2e^{-j5\pi/4}}{1+\frac{1}{2}e^{-j5\pi/4}} = 2e^{j0.431\pi} = 2e^{j1.355}$$