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

$$= (1 - e^{j\pi/2} z^{-1} - e^{-j\pi/2} z^{-1} + z^{-2})(1 + e^{j\hat{\omega}})$$

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

$$= (1 - e^{-j\hat{\omega}} + e^{-j2\hat{\omega}})(1 + e^{j\hat{\omega}})$$

$$= (\cancel{1} + e^{j\hat{\omega}} \cancel{- e^{-j\hat{\omega}}} \cancel{-1} + e^{-j2\hat{\omega}} + \cancel{e^{-j\hat{\omega}}})$$

$$= (e^{j\hat{\omega}} + e^{-j2\hat{\omega}})$$

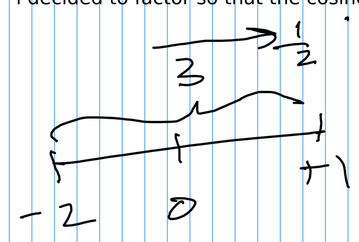
$$= (e^{\frac{3}{2}j\hat{\omega}} + e^{-j\frac{3}{2}\hat{\omega}}) e^{-j\frac{1}{2}\hat{\omega}}$$

$$= \left(2\cos\left(\frac{3}{2}\hat{\omega}\right)\right) e^{-j\frac{1}{2}\hat{\omega}}$$

- use superposition

$$x[n] = 5 + 20\cos(0.25\pi n + 0.25\pi) + \delta[n-3]$$

i decided to factor so that the cosine term could come out



$$H(e^{j0}) = 2e^{-j0}$$

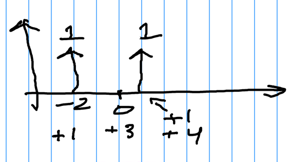
$$H(e^{j\pi/4}) = 2\cos\left(\frac{3\pi}{8}\right) e^{-j\frac{3\pi}{16}}$$

$$= 0.7656\, e^{-j3\pi/16}$$

$$y[n] = 10 + 15.3\cos\left(0.25\pi n + \frac{7\pi}{16}\right) + \underbrace{(\quad)}_{}$$

resp due to $\delta[n-3]$

$$y[n] = x[n+1] + x[n-2]$$



used the delta function and delayed by 3

$$\boxed{y[n] = 10 + 15.3\cos\left(0.25\pi n + \frac{7\pi}{16}\right) + \delta[n-1] + \delta[n+4]}$$

$G = 10\log(4\pi A/\lambda^2) \qquad = 20\log_{10}(2\pi r/\lambda)$

$\cancel{A}\pi r^2$

$10\log(4\pi(\pi r^2)/\lambda^2) = 20$

$G = 10\log(x^2) \qquad = \qquad 20\log(x)$

$G = 10\log(3^2 4^2) \qquad = \qquad 20\log(3^2 4)$

just ignore this, i was helping someone understand log and exponent last night.

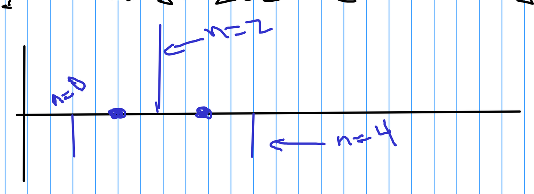
i love math and i try to do it as much as possible.

more solutions on the next page

$$y[n] = -x[n] + 2x[n-2] - x[n-4]$$

I. $x[n] = \delta[n]$ impulse response

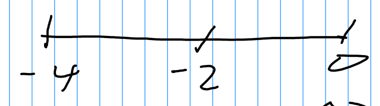
$$h[n] = -\delta[n] + 2\delta[n-2] - \delta[n-4]$$



II. $H(e^{j\hat{\omega}}) = \left(-1 + 2e^{-j2\hat{\omega}} - e^{-j4\hat{\omega}}\right)$

$$= R(e^{j\hat{\omega}})\, e^{-j\hat{\omega} n_0}$$

$$- (\ 2\cos(\hat{\omega}) = e^{+j\hat{\omega}} + e^{-j\hat{\omega}}$$



$$H(e^{j\hat{\omega}}) = \left(-1e^{j\hat{\omega}2} + 2 - e^{-j2\hat{\omega}}\right) e^{-j\hat{\omega}2}$$

$$\boxed{H(e^{j\hat{\omega}}) = \left(2 - 2\cos(2\hat{\omega})\right) e^{-j\hat{\omega}2}}$$