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

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

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

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

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

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

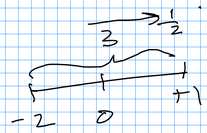
$$= (e^{\frac{3}{2}j\hat{\omega}} + e^{-j\frac{3}{2}\hat{\omega}}) e^{-j\frac{1}{2}\hat{\omega}}$$

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

∴ 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



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

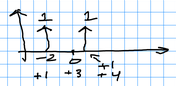
$$H(e^{j\pi/4}) = 2\cos\left(\frac{3\pi}{8}\right) e^{-j\frac{3\pi}{16}}$$

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

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

$$y[n] = 10 + 15.3\cos(0.25\pi n + \tfrac{3\pi}{16}) + (\quad)$$

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



used the delta function and delayed by 3

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

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

$A = \pi r^2$

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

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

$G = 10\log(z^2\phi^2) = 20\log(z^2\phi)$

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

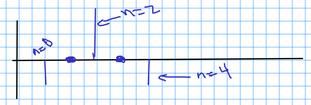
i love math and i try to do it as much as possible.

more solutions on the next page

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

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

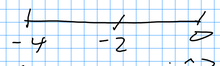
$$h[n] = -\delta[n] + 2\delta[n-2] - \delta[n-4]$$



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

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

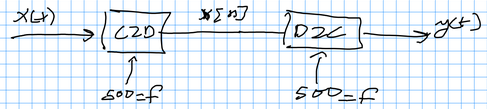
$$-1\left[2\cos(\hat{\omega}) = e^{+j\hat{\omega}} + e^{-j\hat{\omega}}\right]$$

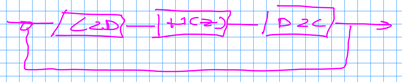


$$H(e^{j\hat{\omega}}) = \left(-1e^{j\hat{\omega}2} + 2 - e^{-j2\hat{\omega}}\right)e^{-j\hat{\omega}2}$$

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

$$x(t) = 5\cos(200\pi t) + 10\cos\left(800\pi t + \frac{\pi}{3}\right) + 2\cos\left(2000\pi t + \frac{\pi}{6}\right)$$





$$x[n] = x(t)\Big|_{t=\frac{n}{f}}$$

$$x[n] = 5\cos\left(\frac{2\pi}{5}n\right) + 10\cos\left(1.6\pi n + \frac{\pi}{3}\right) + 2\cos\left(4.4\pi n + \frac{\pi}{6}\right)$$

$$x[n] = 5\cos(0.4\pi n) + 10\cos\left((2-0.4)\pi n + \frac{\pi}{3}\right) + 2\cos\left((4+0.4)\pi n + \frac{\pi}{6}\right)$$

$$x[n] = 5\cos(0.4\pi n) + 10\cos\left(-0.4\pi n + \frac{\pi}{3}\right) + 2\cos\left(0.4\pi n + \frac{\pi}{6}\right)$$

$$\cos(-\theta) = \cos(\theta)$$

$$x[n] = 5\cos(0.4\pi n) + 10\cos\left(0.4\pi n - \frac{\pi}{3}\right) + 2\cos\left(0.4\pi n + \frac{\pi}{6}\right)$$

$$x[n] = 5\angle 0 + 10\angle -\frac{\pi}{3} + 2\angle +\frac{\pi}{6}$$

$$x[n] = 5\left(\cos(0) + j\sin(0)\right) + 10\left(\cos\left(-\frac{\pi}{3}\right) + j\sin\left(-\frac{\pi}{3}\right)\right) + 2\left(\cos\left(\frac{\pi}{6}\right) + j\sin\left(+\frac{\pi}{6}\right)\right)$$

$$x[n] = (5 + j0) + (5 - j8.66) + (1.73 + j1)$$

$$x[n] = 11.73 - j7.66 \Rightarrow x[n] = \sqrt{11.73^2 + (-7.66)^2}\cos\left(0.4\pi n + \tan^{-1}\left(\frac{-7.66}{11.73}\right)\right)$$

$$\boxed{x[n] = 14.01\cos(0.4\pi n - 0.6784)}$$

$$y(t) = x[n]\Big|_{n=tf} = t500$$

$$\boxed{y(t) = 14.01\cos(200\pi t - 0.6784)}$$