$$y(n) = x[n] + 1.5x[n-1] + x[n-2]$$
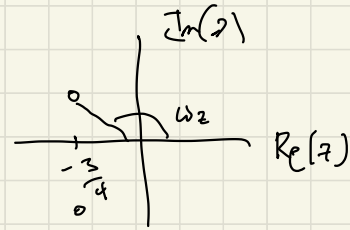
$$H(z) = (1 - e^{j\omega_z} z^{-1})(1 - e^{-j\omega_z} z^{-1}) \Leftarrow$$

$$Y(z) = X(z) + 1.5 z^{-1} X(z) + z^{-2} X(z)$$

$$H(z) = \frac{Y(z)}{X(z)} = 1 + 1.5 z^{-1} + z^{-2}$$

$$= z^{-2}(z^2 + 1.5 z + 1)$$

$$\text{roots}(H(z)) = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1.5 \pm \sqrt{(1.5)^2 - 4}}{2}$$

$$4 > (1.5)^2 \quad \Rightarrow \quad \text{complex}$$

$$\text{roots}(H(z)) = -\frac{3}{4} \pm j\frac{1}{2}\sqrt{4 - (1.5)^2} = z_1, z_2$$

$$|z_1| = \sqrt{\left(\frac{3}{4}\right)^2 + \left(\frac{1}{2}\sqrt{4 \cdot \left(\frac{3}{2}\right)^2}\right)^2}$$

$$= \sqrt{\left(\frac{3}{4}\right)^2 + \frac{1}{4}\left(4 - \frac{9}{4}\right)} = 1 \qquad \substack{\text{by} \\ \text{problem} \\ \text{statement}}$$

$$\omega_z = \angle z_1 = \tan^{-1}\left(\frac{\frac{1}{2}\sqrt{4 - \left(\frac{3}{2}\right)^2}}{-\frac{3}{4}}\right) \pm \pi$$

$$= \pm\pi + \tan^{-1}\left(\frac{\sqrt{4 - \frac{9}{4}}}{-\frac{3}{2}}\right) = \tan^{-1}\left(\frac{\sqrt{7/4}}{-3/2}\right) \pm \pi$$

$$= \pm\pi + \tan^{-1}\left(\frac{\sqrt{7}/2}{-3/2}\right) = \tan^{-1}\left(\frac{\sqrt{7}}{-3}\right) \pm \pi$$