

$$r = \alpha + \beta j$$

$$r^* = \alpha - \beta j$$

$$X[n] = b_0 \delta[n] + b_1 \delta[n-1] + b_2 \delta[n-2]$$

$$X(\omega) = b_0 + b_1 e^{-j\omega} + b_2 e^{-j2\omega}$$

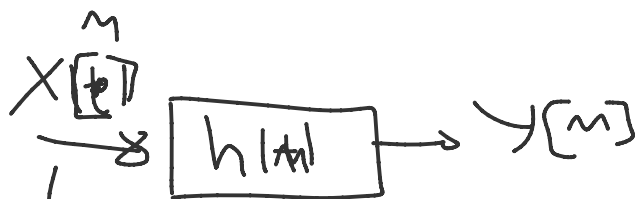
$$X(z) = b_0 + b_1 z^{-1} + b_2 z^{-2}$$

$$X(z) = \sum_{k=0}^{\infty} X[k] z^{-k} = \frac{1}{(1-r_1 z^{-1})(1-r_2 z^{-1})}$$

$$X(z) = (1-r z^{-1})(1-r^* z^{-1}) =$$

$$= (r+r^*)z^{-1} + r \cdot r^* z^{-2} = |X(\omega)| = |1 - (r+r^*)e^{-j\omega} + |r r^*| e^{-j2\omega}|$$

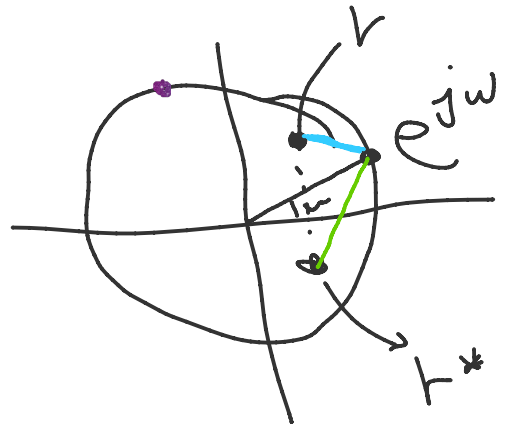
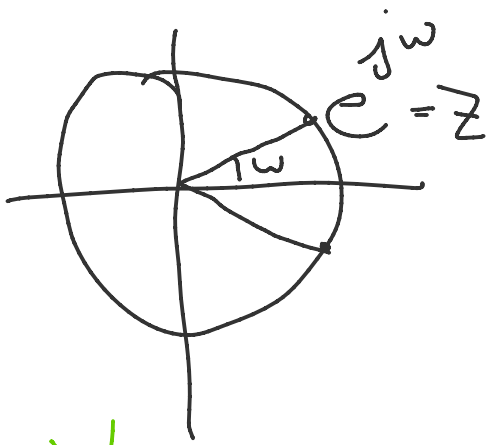
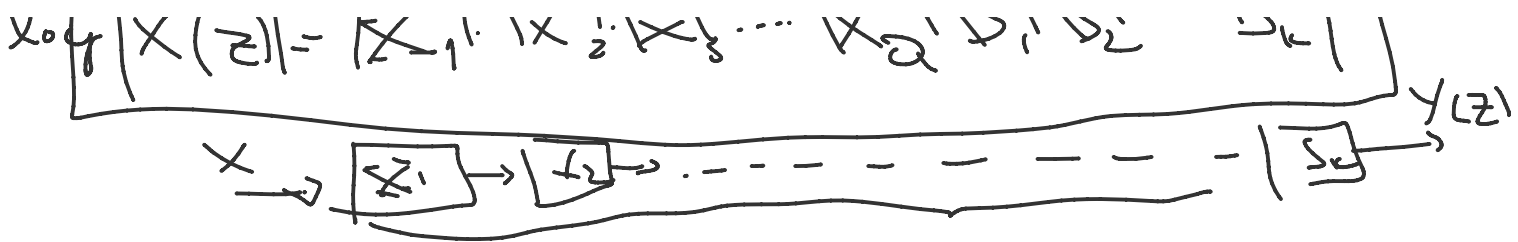
$$X(z) = \underbrace{\prod_{k=0}^Q (1-r_k z^{-1})(1-r_k^* z^{-1})}_{X_k} \underbrace{\prod_{k=0}^P (1-s_k z^{-1})}_{S_k}$$



$$X(z) \cdot h(z) \rightarrow Y(z)$$

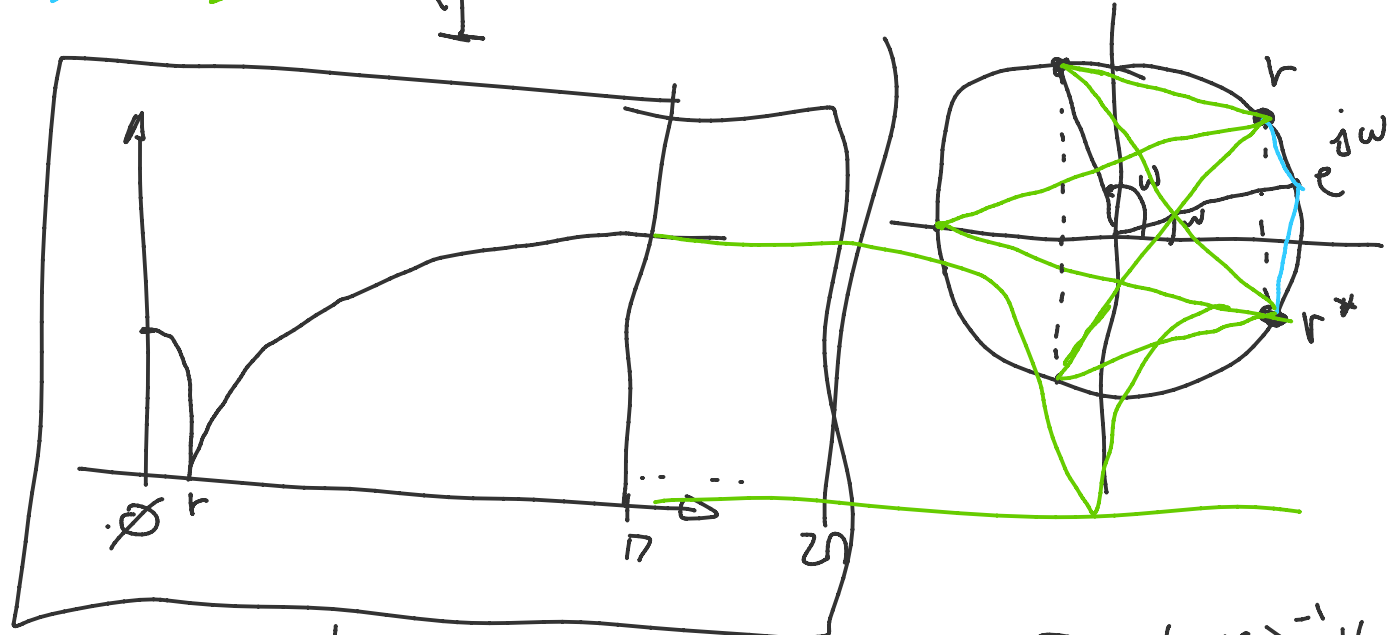
$$\log |X(z)| = \sum_j \log |x_j| + \sum_i \log |s_i|$$

$$\log |X(z)| = |X_1| \cdot |X_2| \cdot |X_3| \cdots |X_Q| \cdot |S_1| \cdot |S_2| \cdots |S_k|$$

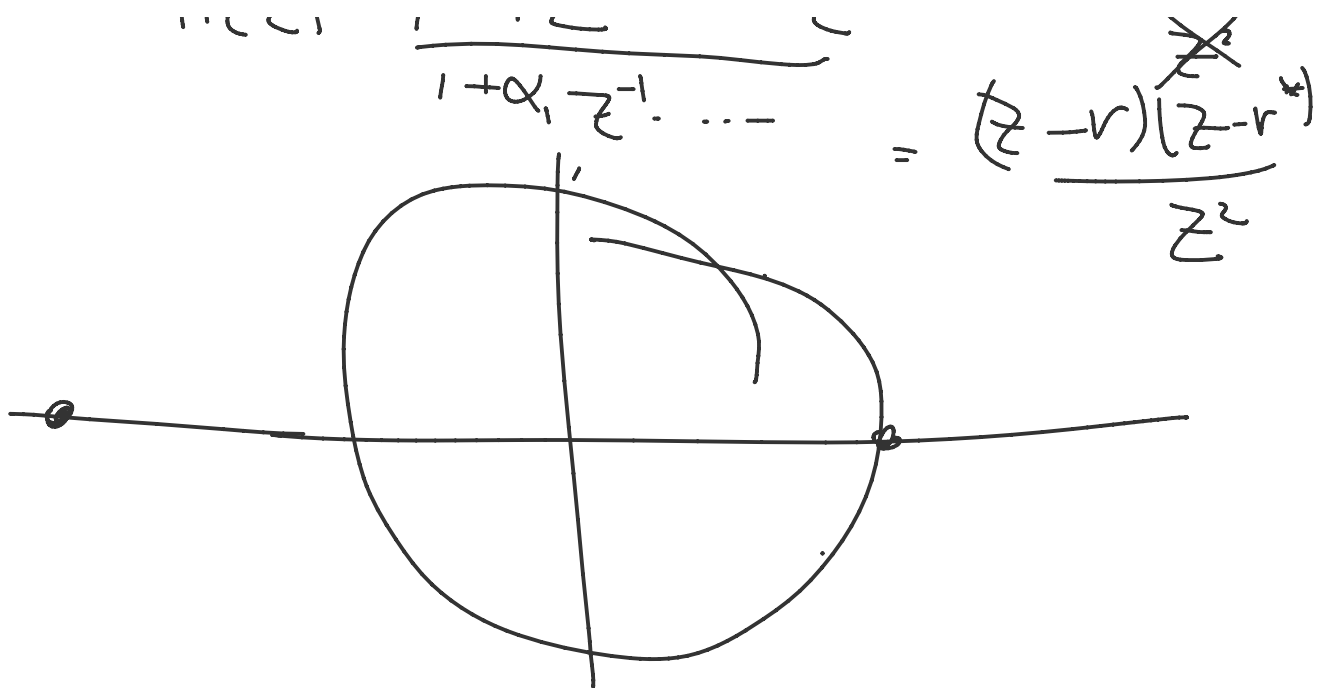


$$|X(\omega)| = |X(e^{j\omega})| = \frac{|e^{j\omega} - r|}{|e^{j\omega} - r^*|}$$

$$|X(z)| = \frac{|z - r|}{|z - r^*|} = \frac{(z - r)(z - r^*)}{z^2}$$



$$H(z) = \frac{1 + z^{-1}}{1 + \alpha z^{-1}} = \frac{(1 - r z^{-1})(1 - r^* z^{-1})}{z^2}$$



$$z \rightarrow e^{j\omega}$$

$$H(z) = 1 - 3.28z^{-1} + 4.68z^{-2} - 3.28z^{-3} + z^{-4}$$

$$h[n] = \delta[n] - 3.28\delta[n-1] + 4.68\delta[n-2] - 3.28\delta[n-3] + \delta[n-4]$$

$$H(\omega) = 1 - 3.28e^{-j\omega} + 4.68e^{-j2\omega} - 3.28e^{-j3\omega} + e^{-j4\omega}$$

1	0.222
180	x: $x = 0.222 \times 180$

$$H(z) = \frac{\sum_{i=0}^N b_i z^{-i}}{M}, \quad \alpha = 1$$

$$||z|| = \frac{r^y}{\sum_{i=0}^M \alpha_i z^{-i}}, \quad \alpha_0 = 1$$

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$$H(z) = \frac{b_0 + b_1 z^{-1} + b_2 z^{-2}}{\alpha_0 + \alpha_1 z^{-1} + \alpha_2 z^{-2}} =$$

$$H(z) = \frac{b'_0 + b'_1 z^{-1} + b'_2 z^{-2}}{e^{j\omega} + \alpha'_1 z^{-1} + \alpha'_2 z^{-2}} =$$

$$= \frac{(z - r_b)(z - r_b^*)}{(z - r_a)(z - r_a^*)} \Rightarrow$$

$$\log |H(\omega)| = \log |(e^{j\omega} - r_b) \cdot (e^{j\omega} - r_b^*)| -$$

$$- \log |(e^{j\omega} - r_a) \cdot (e^{j\omega} - r_a^*)|$$

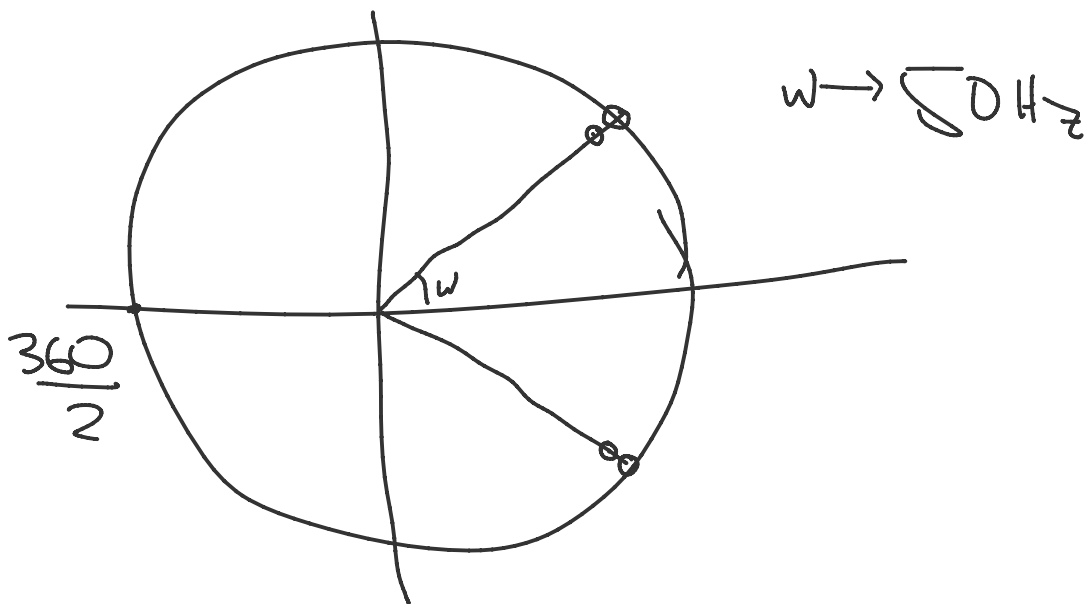
$$y[n] = 2x[n] + 3x[n-1] + 2x[n-2] + 0.5y[n-1] + 0.1y[n-2]$$

$H(z)$

$$\frac{Y(z)}{X(z)} = \frac{2X(z) + 3X(z)z^{-1} + 2X(z)z^{-2} + 0.5Y(z)z^{-1} + 0.1Y(z)z^{-2}}{X(z)} \Rightarrow$$

$$H(z) = 2 + 3z^{-1} + 2z^{-2} + 0.5z^{-1}H(z) + 0.1z^{-2}H(z) \Rightarrow$$

$$\Rightarrow H(z) = \frac{2 + 3z^{-1} + 2z^{-2}}{1 - 0.5z^{-1} - 0.1z^{-2}}$$



$$\frac{360}{50} \quad \frac{2\pi}{w} \Rightarrow \omega = 2\pi \cdot \frac{50}{360} =$$

$$y[n] = x[n] - 1.2056x[n-1] + x[n-2]$$

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

