

$$X(z) = \sum_{k=1}^{\infty} (bz)^k + \sum_{k=0}^{\infty} (bz^{-1})^k$$

$r = bz$ $r = bz^{-1}$

$$X(z) = \underset{(k=1)}{bz} \cdot \frac{1-0}{1-bz} + \underset{(k=0)}{1} \cdot \frac{1}{1-bz^{-1}}$$

$$= \frac{bz}{1-bz} + \frac{1}{1-bz^{-1}} = \frac{bz(1-bz^{-1}) + 1-bz}{(1-bz)(1-bz^{-1})}$$

$$X(z) = \frac{1-b^2}{\underbrace{(1-bz)}_{z_0} \underbrace{(1-bz^{-1})}_{z_1}}$$

2 Poles : $z_0 = \frac{1}{b}$

$z_1 = b$

or $|z_0| > 1 \Rightarrow$ Filter unstable

