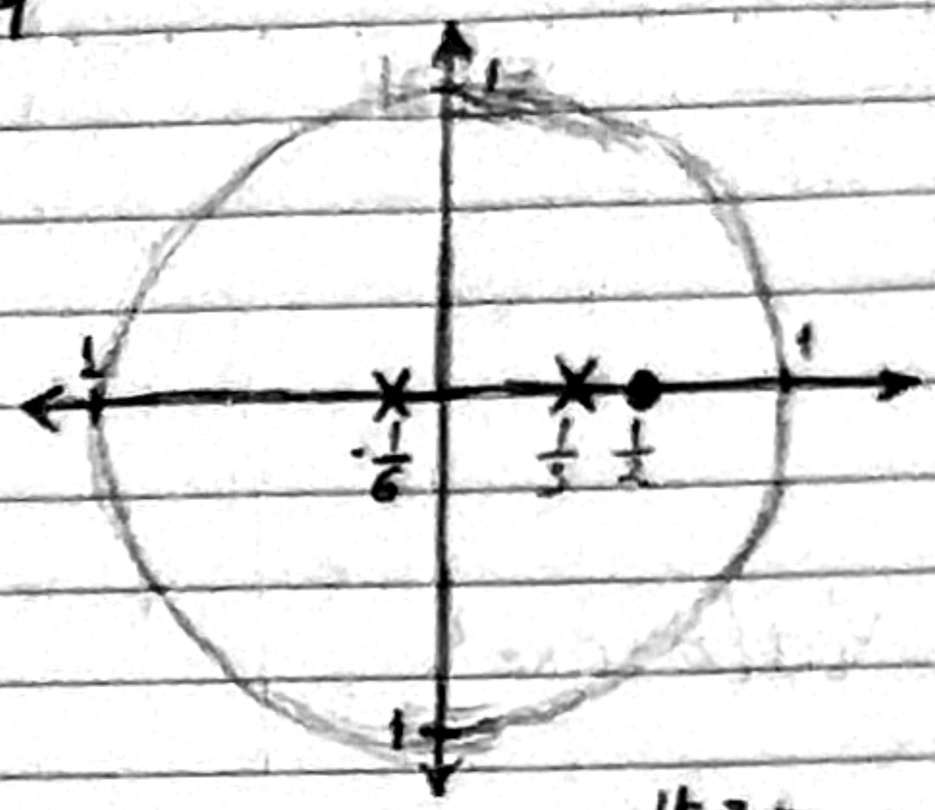
data
fecha

Short Test 9

poles: $\frac{1}{3}, -\frac{1}{6}$

zero: $\frac{1}{2}$



$$H[z] = \frac{z - 0.5}{\left(z - \frac{1}{3}\right)\left(z + \frac{1}{6}\right)}$$

$$H[z] = \frac{z - 5}{z^2 + \frac{1}{6}z - \frac{1}{6}z - \frac{1}{18}}$$

$$H[z] = \frac{z - 5}{z^2 - \frac{1}{6}z - \frac{1}{18}}$$

$$H[z] = \frac{z^{-1} - 0.5z^{-2}}{1 - \frac{1}{6}z^{-1} - \frac{1}{18}z^{-2}}$$

$$\frac{Y[z]}{X[z]} = H[z]$$

$$\frac{Y[z]}{X[z]} = \frac{z^{-1} - 0.5z^{-2}}{1 - \frac{1}{6}z^{-1} - \frac{1}{18}z^{-2}}$$

$$Y[z]\left(1 - \frac{1}{6}z^{-1} - \frac{1}{18}z^{-2}\right) = X[z]\left(z^{-1} - 0.5z^{-2}\right)$$

$$Y[z] - \frac{1}{6}Y[z]z^{-1} - \frac{1}{18}Y[z]z^{-2} = X[z]z^{-1} - 0.5X[z]z^{-2}$$

$$y[n] - \frac{1}{6}y[n-1] - \frac{1}{18}y[n-2] = x[n-1] - 0.5x[n-2]$$

$$y[n] = x[n-1] - 0.5x[n-2] + \frac{1}{6}y[n-1] + \frac{1}{18}y[n-2]$$

Answer: Yes, it's a stable and casual transfer function, cause the poles numbers are inside of the unit circle in the z plane.