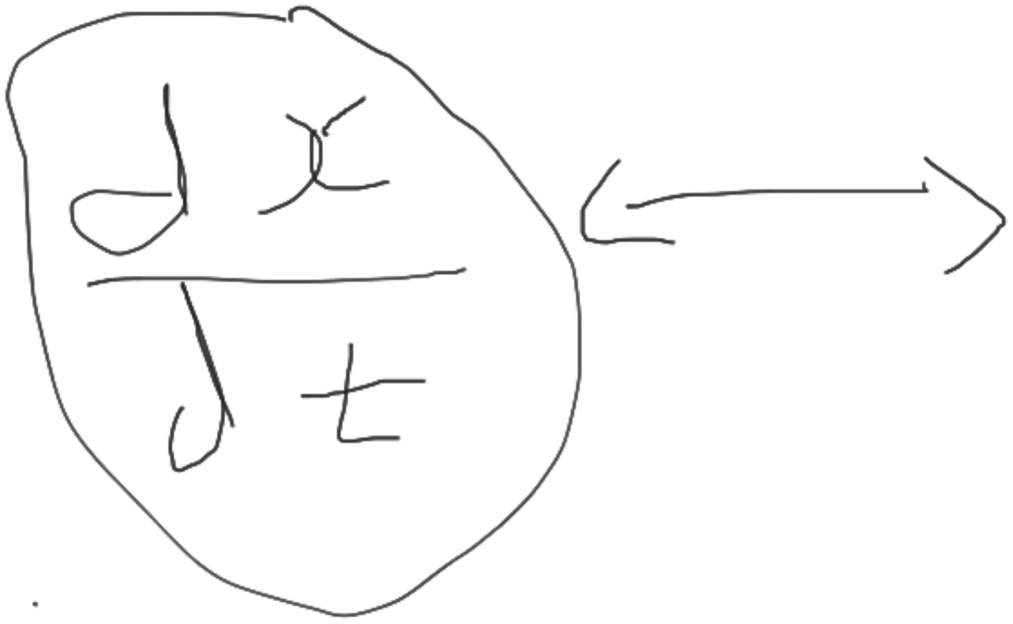
$x \longleftrightarrow X(s)$



$\longleftrightarrow$

$Y(s)$

$Y(x)$

$$\mathcal{L}\left(\frac{d^2x}{dt^2}\right) = sX(s) - sx(0^-) - x'(0^-)$$

$$\dot{y} + ay = u$$

$$sy(s) - y(0) + aY(s) = U(s)$$

$$Y(s+a) = \frac{U}{s+a} + \frac{y(0)}{s+a}$$

1 $u(t,x)$

2 $\hat{u}(t,\omega) = \int_{-\infty}^{\infty} u\, e^{-j\omega x}\, dx$

3 $v(s,x) = \int_{0^-}^{\infty} u e^{-st}\, dt$

4 $\hat{v}(s,\omega) = \int_{0^-}^{\infty} \hat{u}\, e^{-st}\, dt$

$$\int_{-\infty}^{\infty} |h| \, dt < \infty$$

$$\Downarrow$$

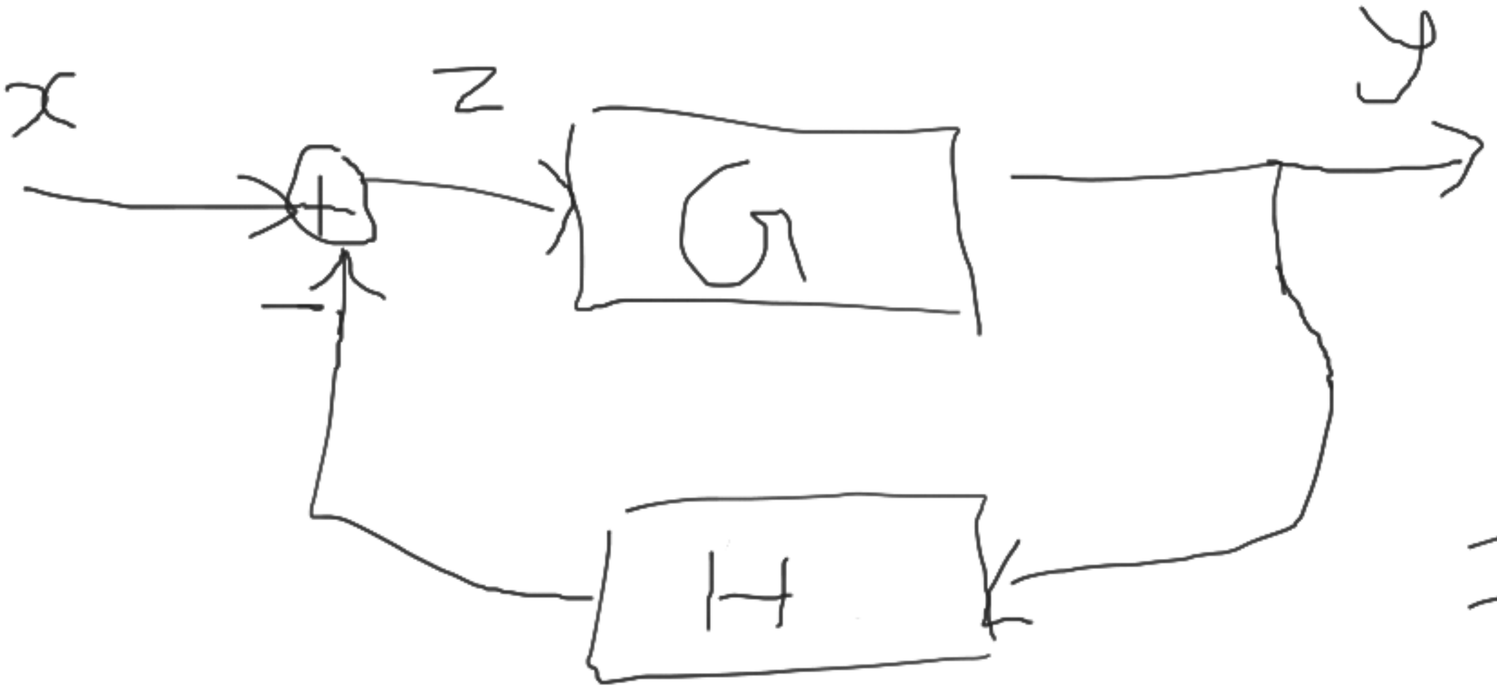
$$\int h \, e^{j\omega t} < \infty$$

$$H(j\omega)$$

ROC

$\sigma = 0$

$$G = G_1 G_2$$



$$y(s) = G \cdot Z$$

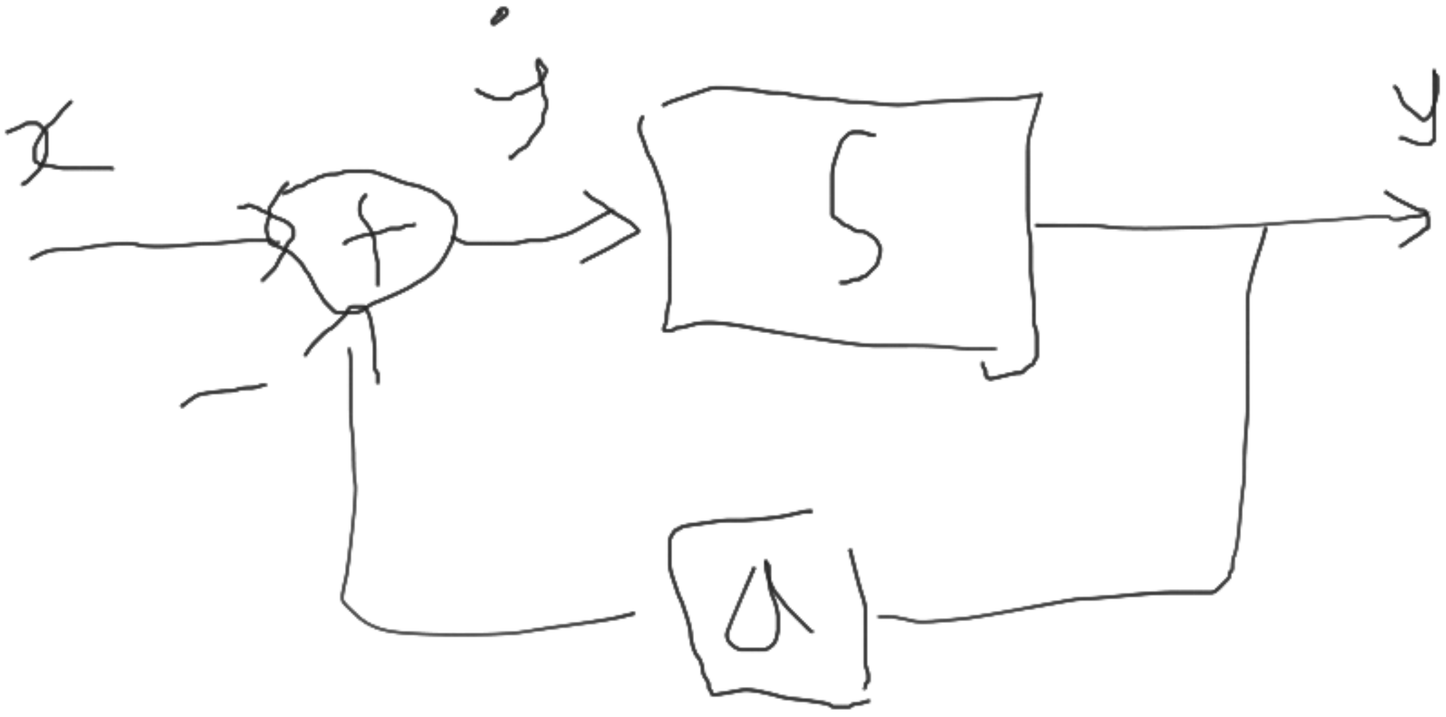
$$= G(-Hy + X)$$

$$y(1+GH) = GX$$

$$\frac{y}{x} = \frac{G}{1+GH}$$

order : $\dot{y} + ay = x$

$$G(s) = \frac{1}{s+a}$$



$$\frac{N(s)}{D(s)}$$

Rational f.n

real f.n

$$\frac{s+1}{s+2} = \left(\frac{1}{s+2}\right) \cdot (s+1)$$

$$x = a^n u(n) \qquad X(z) = \sum_0^\infty a^n z^{-n}$$

$$= \sum_0^\infty (az^{-1})^n$$

$$1 + x + \cdots = \frac{1}{1-x}$$

$$\left|\frac{a}{z}\right| < 1$$

$$|a| < |z|$$

$$X(z) = \frac{1}{1 - az^{-1}}$$