



$$y[n] + a_1 y[n-1] + a_2 y[n-2] + \dots = b_0 x[n] + b_1 x[n-1] + \dots$$

$$Y[z] + a_1 z^{-1} Y[z] + \dots = b_0 X[z] + b_1 z^{-1} X[z] + \dots$$

$$\frac{Y[z]}{X[z]} = \frac{b_0 + b_1 z^{-1} + \dots + b_m z^{-m}}{1 + a_1 z^{-1} + a_2 z^{-2} + \dots + a_n z^{-n}}$$

$$y(t) + a_1 \frac{dy(t)}{dt} + a_2 \frac{d^2 y(t)}{dt^2} + \dots = b_0 x(t) + b_1 \frac{dx(t)}{dt} + \dots$$

$$Y(s) + a_1 s Y(s) + a_2 s^2 Y(s) + \dots = b_0 X(s) + b_1 s X(s) + \dots$$

$$H(s) = \frac{Y(s)}{X(s)} = \frac{b_0 + b_1 s + b_2 s^2 + \dots}{1 + a_1 s + a_2 s^2 + \dots}$$