



$$\text{slope} = \frac{\Delta y}{\Delta t}$$

$$\lim_{\Delta t \rightarrow 0} \text{slope} \rightarrow \frac{dx(t)}{dt}$$

$$y[n] = \frac{x[n] - x[n-1]}{T}$$

1<sup>st</sup> order

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

$$= \frac{1}{T} X(z) [1 - z^{-1}]$$

$$\frac{Y(z)}{X(z)} = \frac{1}{T} [1 - z^{-1}]$$

$$y[n] = \frac{x[n+1] - x[n-1]}{2T}$$

$$Y(z) = \alpha_1 Y(z) + \alpha_2 Y(z) + \beta_1 X(z) + \beta_2 X(z) + \dots$$