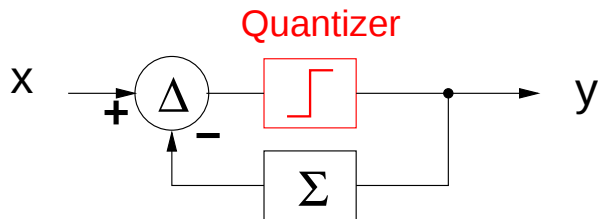
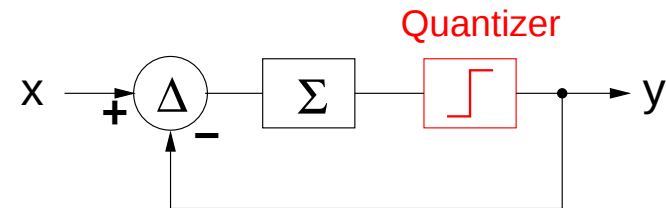


Delta Modulation versus Delta-Sigma Modulation

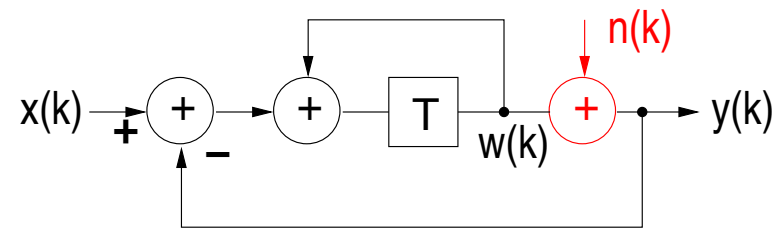
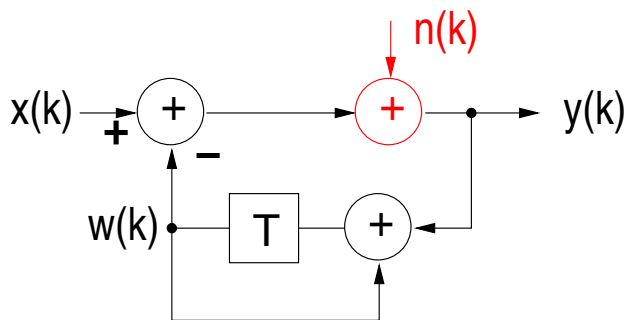
Delta Modulator



Delta-Sigma Modulator



(Linear) Discrete-Time Models



Equations

$$\begin{cases} y(k) = x(k) - w(k) + n(k) \\ w(k) = w(k-1) + y(k-1) \end{cases}$$

$$\begin{cases} Y(z) = X(z) - W(z) + N(z) \\ W(z) = [W(z) + Y(z)] z^{-1} \end{cases}$$

$$Y(z) = [X(z) + N(z)] [1 - z^{-1}]$$

z-Transf.

$$\begin{cases} y(k) = w(k) + n(k) \\ w(k) = w(k-1) + x(k-1) - y(k-1) \end{cases}$$

$$\begin{cases} Y(z) = W(z) + N(z) \\ W(z) = [W(z) + X(z) - Y(z)] z^{-1} \end{cases}$$

$$Y(z) = X(z) z^{-1} + N(z) [1 - z^{-1}]$$