

Simply RC Circuit:

$$\begin{aligned}
 H(s) &= \frac{1}{1 + \frac{\omega}{\omega_p}} \\
 \mathcal{L}^{-1}\{H(s)\} &= -\omega_p^2 e^{-\omega_p t} \\
 v_{\text{in}}(t) - v_{\text{out}}(t) &= \omega_p \frac{dv_{\text{out}}}{dt} \\
 \Rightarrow \text{ret}[x] &= (y[x+1]/(\omega_p)) - (y[x]/(\omega_p));
 \end{aligned} \tag{1}$$

Butterworth Filter:

$$\begin{aligned}
 H(s) &= \frac{1}{(s^2 - 2\cos(\frac{7\pi}{12})s + 1)(s^2 - 2\cos(\frac{3\pi}{4})s + 1)(s^2 - 2\cos(\frac{11\pi}{12})s + 1)} \\
 v_{\text{in}}(t) - v_{\text{out}}(t) &= \omega_p \frac{dv_{\text{out}}}{dt} \\
 \Rightarrow \text{ret}[x] &= (y[x+1]/(\omega_p)) - (y[x]/(\omega_p));
 \end{aligned} \tag{2}$$

$$\frac{(-2\sin(\frac{3\pi}{4})\sin(\frac{7\pi}{12})(\cos(\frac{3\pi}{4}) - \cos(\frac{7\pi}{12}))((- \cos(\frac{11\pi}{12})^2 + \frac{1}{2})\sin(t\sin(\frac{11\pi}{12})) + \cos(t\sin(\frac{11\pi}{12}))\cos(\frac{11\pi}{12})\sin(\frac{11\pi}{12}))e^{(t\cos(\frac{11\pi}{12}))} + 2\sin(\frac{11\pi}{12})((- \cos(\frac{7\pi}{12})^2 + \frac{1}{2})\sin(t\sin(\frac{7\pi}{12})) + \cos(t\sin(\frac{7\pi}{12}))\cos(\frac{7\pi}{12})\sin(\frac{7\pi}{12}))e^{(t\cos(\frac{7\pi}{12}))} + 2\sin(\frac{7\pi}{12})((- \cos(\frac{3\pi}{4})^2 + \frac{1}{2})\sin(t\sin(\frac{3\pi}{4})) + \cos(t\sin(\frac{3\pi}{4}))\cos(\frac{3\pi}{4})\sin(\frac{3\pi}{4}))e^{(t\cos(\frac{3\pi}{4}))})}{(4\sin(\frac{11\pi}{12})\sin(\frac{7\pi}{12})\sin(\frac{3\pi}{4})(\cos(\frac{3\pi}{4}) - \cos(\frac{7\pi}{12}))(- \cos(\frac{11\pi}{12})^2 + \frac{1}{2})\cos(\frac{11\pi}{12})\sin(\frac{11\pi}{12}))e^{(t\cos(\frac{11\pi}{12}))} + (4\sin(\frac{11\pi}{12})\sin(\frac{7\pi}{12})\sin(\frac{3\pi}{4})(\cos(\frac{3\pi}{4}) - \cos(\frac{7\pi}{12}))(- \cos(\frac{7\pi}{12})^2 + \frac{1}{2})\cos(\frac{7\pi}{12})\sin(\frac{7\pi}{12}))e^{(t\cos(\frac{7\pi}{12}))} + (4\sin(\frac{11\pi}{12})\sin(\frac{7\pi}{12})\sin(\frac{3\pi}{4})(\cos(\frac{3\pi}{4}) - \cos(\frac{7\pi}{12}))(- \cos(\frac{3\pi}{4})^2 + \frac{1}{2})\cos(\frac{3\pi}{4})\sin(\frac{3\pi}{4}))e^{(t\cos(\frac{3\pi}{4}))})}$$