

$$\begin{aligned}
1 &= c_1 \frac{1}{2} + c_2 + \frac{1}{3} c_3 & 1 &= c_1 \frac{1}{2} - 3 c_3 & -\frac{5}{2} c_1 &= 1 \\
0 &= c_1 + \frac{1}{3} c_2 + \frac{1}{9} c_3 & \frac{2}{5} &= \frac{1}{3} c_2 + \frac{1}{9} c_3 & c_1 &= -\frac{2}{5} \\
0 &= \frac{1}{4} c_1 + \frac{1}{2} c_2 + c_3 & \frac{1}{10} &= \frac{1}{2} c_2 + c_3 & \frac{3}{8} c_2 &= \frac{3}{10} & c_2 &= \frac{7}{5} \\
&& \frac{36}{10} \cdot \frac{1}{5} &= 3 c_2 & c_3 &= \frac{1}{10} - \frac{7}{10} = c_3 = -\frac{3}{5}
\end{aligned}$$

$$\boxed{-\frac{2}{5} y[n-1] + \frac{7}{5} y[n] - \frac{3}{5} y[n+1] = \delta[n]}$$