

$$y[n] + a_1 y[n - 1] + a_2 y[n - 2] = b_0 x[n] + b_1 x[n - 1] + b_2 x[n - 2].$$

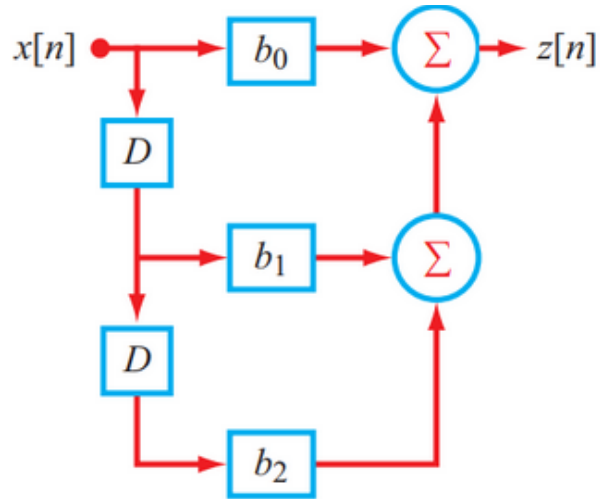
$$z[n] = b_0 x[n] + b_1 x[n - 1] + b_2 x[n - 2],$$

$$z[n] = y[n] + a_1 y[n - 1] + a_2 y[n - 2].$$

$$y[n] = z[n] - a_1 y[n - 1] - a_2 y[n - 2].$$

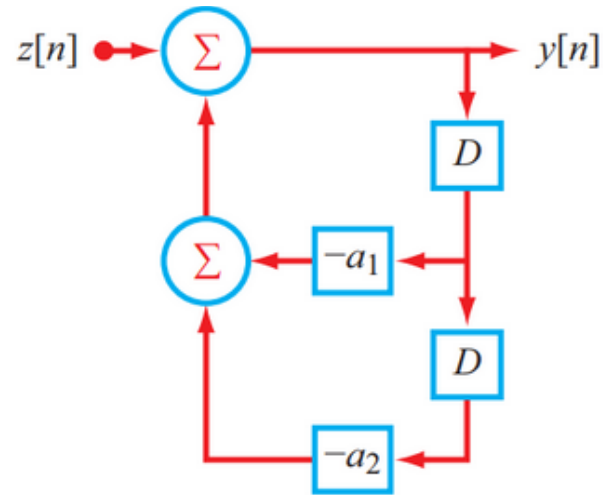
Reversing the order of the two realizations in figures (a) and (b), and replacing the duplicated chains of shift elements with a shared single chain, yield the final Direct Form II realization in figure (c).

$$z[n] = b_0 x[n] + b_1 x[n - 1] + b_2 x[n - 2],$$

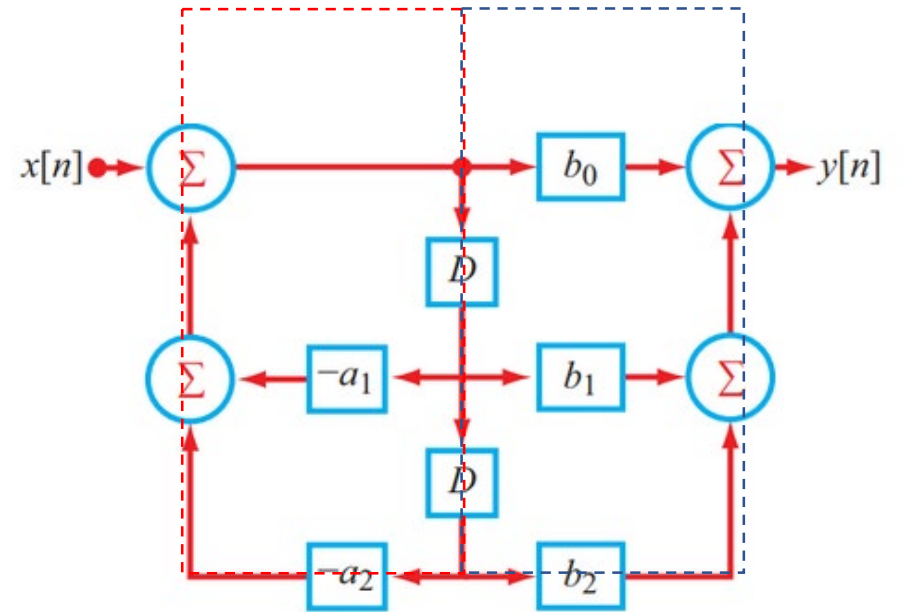


(a) Realization of $z[n]$ from $x[n]$

$$y[n] = z[n] - a_1 y[n - 1] - a_2 y[n - 2].$$



(b) Realization of $y[n]$ from $z[n]$



(c) Realization of $y[n]$ from $x[n]$