Source task and conventions

Implement $H(z) = \gamma_0 + 0.3/(1 + 0.5z^{-1}) + (1 + 0.4z^{-1} + 0.33z^{-2})/(1 - 0.62z^{-1} + 0.43z^{-2})$.

Conventional solution and proof

Feed the same input to a direct branch, one first-order branch and one second-order branch:

$$v[n] = x[n] - 0.5v[n-1], \qquad y_1[n] = 0.3v[n],$$

$$w[n] = x[n] + 0.62w[n-1] - 0.43w[n-2], \quad y_2[n] = w[n] + 0.4w[n-1] + 0.33w[n-2],$$

$$\boxed{y[n] = \gamma_0 x[n] + y_1[n] + y_2[n].}$$