

DSP TX00CQ31-3006 exercises 3

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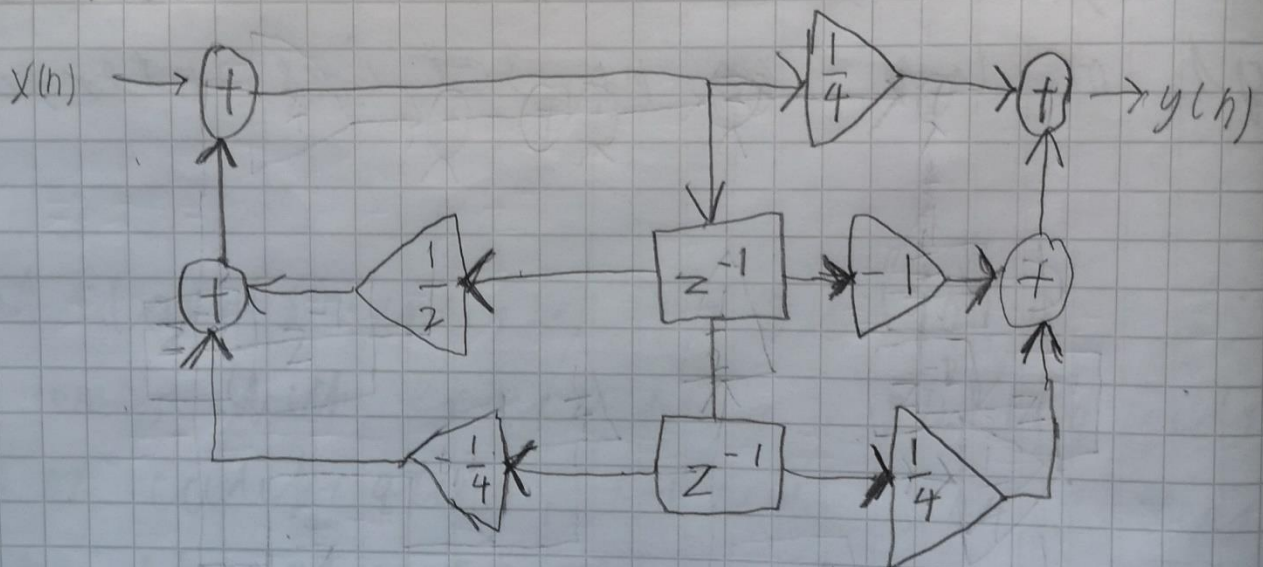
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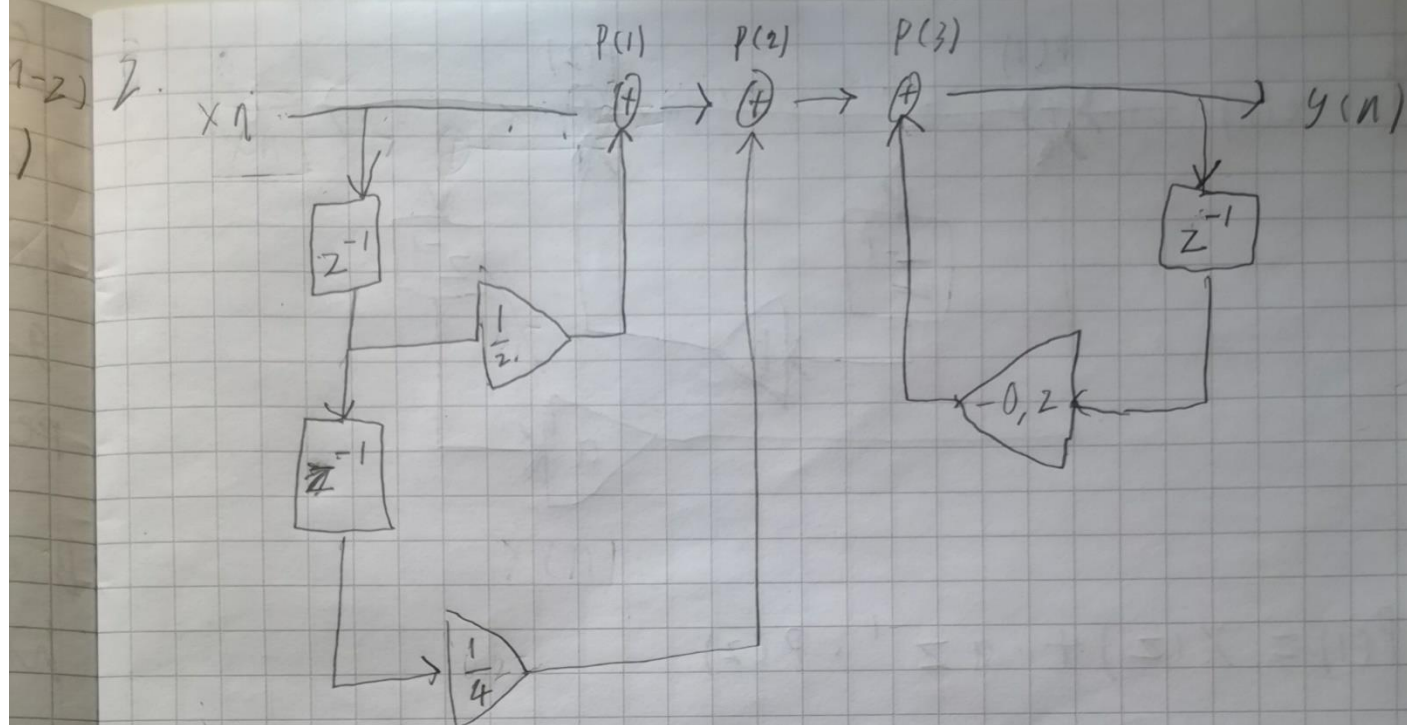
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$$1. \quad y(n) - \frac{1}{2}y(n-1] + \frac{1}{4}y(n-2) = \frac{1}{4}x(n) - x(n-1] + \frac{1}{4}x(n-2)$$

$$Y(z) \cdot (1 - \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}) = X(z) (\frac{1}{4} - z^{-1} + \frac{1}{4}z^{-2})$$

$$H(z) = \frac{\frac{1}{4} - z^{-1} + \frac{1}{4}z^{-2}}{1 - \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}}$$





$$P(1) = X(z) + \frac{1}{2} z^{-1} \cdot X(z)$$

$$P(2) = P(1) + \frac{1}{4} z^{-2} \cdot X(z)$$

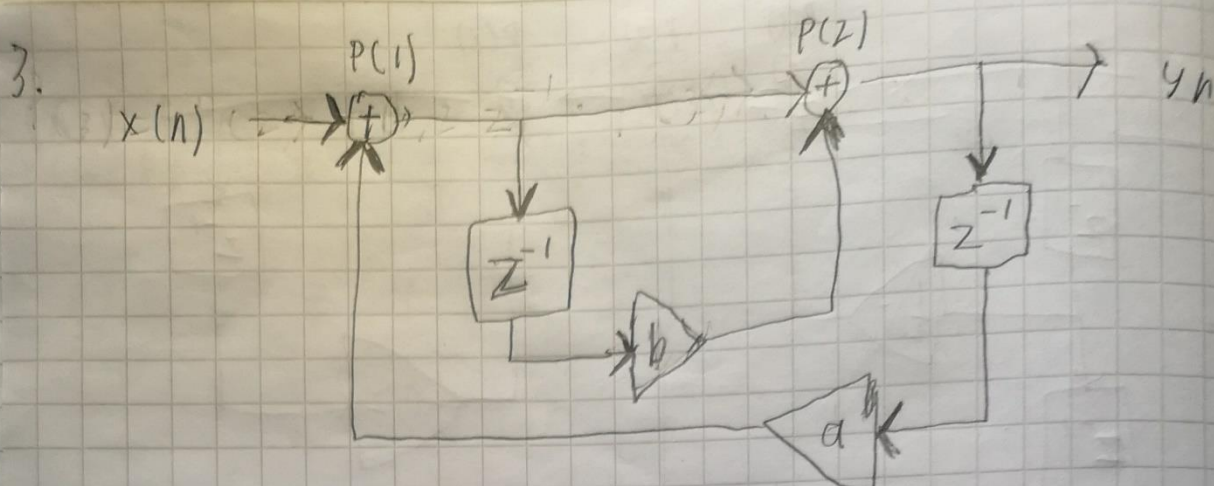
$$P(2) = X(z) + \frac{1}{2} z^{-1} \cdot X(z) + \frac{1}{4} z^{-2} \cdot X(z)$$

$$P(2) = X(z) \left(1 + \frac{1}{2} z^{-1} + \frac{1}{4} z^{-2} \right)$$

$$P(3) = y[n] = P(2) - 0.2 z^{-1} \cdot P(3)$$

$$= \frac{P(2)}{1 + 0.2 z^{-1}} = X(z) \cdot \frac{1 + \frac{1}{2} z^{-1} + \frac{1}{4} z^{-2}}{1 + 0.2 z^{-1}}$$

$H(z)$



$$P(1) = X(z) + a z^{-1} \cdot P(2)$$

$$X(z) = P(2) = P(1) + b z^{-1} \cdot P(1)$$

$$P(2) = X(z) + a z^{-1} \cdot P(2) + X(z) \cdot b z^{-1} + a b z^{-2} \cdot P(2)$$

$$P(2) (1 - a z^{-1} - a b z^{-2}) = X(z) + X(z) b z^{-1}$$

$$P(2) = X(z) \frac{1 + b z^{-1}}{1 - a z^{-1} - a b z^{-2}}$$

$H(z)$

Difference equation:

$$X(z) \cdot (1 - a z^{-1} - a b z^{-2}) = X(z) (1 + b z^{-1})$$

$$2 y[n] - a y[n-1] - a b y[n-2] = x[n] + b x[n-1]$$