3.18 Using the notations of signals in the following figure, the difference equation can be written

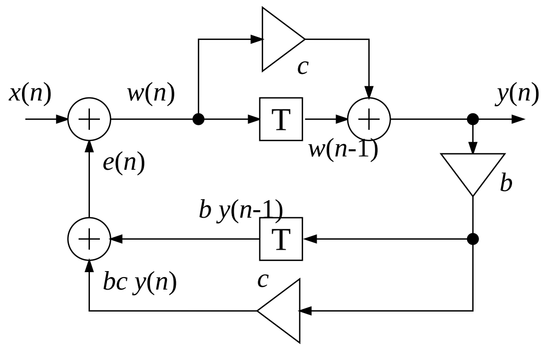
$e(n) = b(cy(n) + y(n-1))$

$w(n) = e(n) + x(n) = b(cy(n) + y(n-1)) + x(n)$

$y(n) = aw(n) + w(n-1)$

$= ab(cy(n) + y(n-1)) + ax(n) + b(cy(n-1) + y(n-2)) + x(n-1)$

$= b(acy(n) + (a + c)y(n-1) + y(n-1) + y(n-2)) + ax(n) + x(n-1)$



Apply the z-transform to the difference equation to obtain the transfer function

$$H(z) = \frac{a + z^{-1}}{(1 - abc) - b(a + c)z^{-1} - bz^{-2}}$$

The zero is $z = -a$, and the two poles are $z = \dfrac{-b(a + c) \pm \sqrt{b(ba^2 - 2abc + bc^2 + 4)}}{2(-1 + abc)}$. The sketch of pole-zero configuration is left to the reader to exploit the value combinations of a, b and c.