

6.4 Using z -transform, the transfer function is

$$H(z) = Z\{h(n)\} = 1 + z^{-1} + \dots + z^{-M} = \frac{1 - z^{-(M+1)}}{1 - z^{-1}}$$

which gives $Y(z) = H(z)X(z) = \frac{1 - z^{-(M+1)}}{1 - z^{-1}}X(z)$

or

$$Y(z) = z^{-1}Y(z) + X(z) - z^{-(M+1)}X(z)$$

Apply the inverse z -transform, the corresponding difference equation is

$$y(n) = y(n-1) + x(n) - x(n-M-1)$$

The high level language realization is left to the reader. The important sequences inside the loop are

{read in input	$x(n)$
{read in old input	$x(n-M-1)$ and $y(n-1)$
{compute	$y(n)$
{overwrite the	$x(n-M-1)$ with $x(n)$
{update	$y(n-1)$ with $y(n)$