Week 1: Problem 7

Name: Mihika. M
Unique ID: 2005119

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

$$= 1(1+z^{-1}-z^{-2}) + 2z^{-1}(1+z^{-1}-z^{-2}) - z^{-2}(1+z^{-1}-z^{-2})$$

$$= 1+z^{-1}-z^{-2}+2z^{-1}+2z^{-2}-2z^{-3}-z^{-2}-z^{-3}+z^{-4}$$

$$= 1+3z^{-1}-3z^{-3}+z^{-4}.$$

$$H(z) = 1+3z^{-1}-3z^{-3}+z^{-4}.$$

$$\frac{y(z)}{x(z)} = 1+3z^{-1}-3z^{-3}+z^{-4}.$$

$$y(z) = x(z)\left(1+3z^{-1}-3z^{-3}+z^{-4}\right).$$

$$y(z) = x(z) + 3z^{-1}x(z) - 3z^{-3}x(z) + z^{-4}x(z).$$