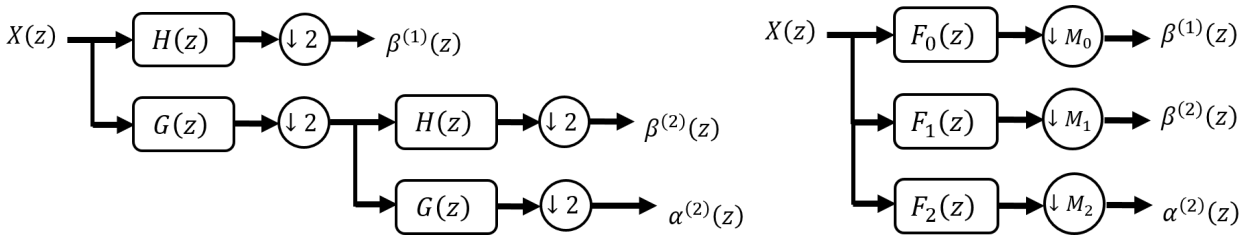
Full Name: _____

EEE 5502 (Fall 2022) – Practice **Multi-Resolution Applications, 2022**

Question #1: Consider the following analysis wavelet bank and filter bank.



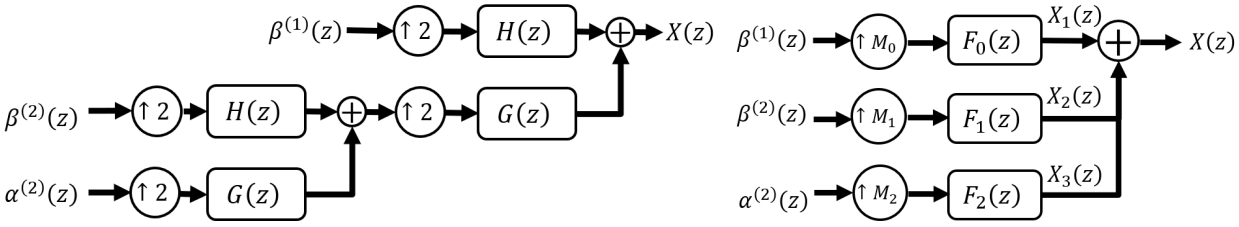
Let these filters be defined by

$$H(z) = (1/\sqrt{2})(1 - z^{-1})$$
$$G(z) = (1/\sqrt{2})(1 + z^{-1})$$

(a) Use the Noble identities to simplify the analysis wavelet bank (left) diagram and represent it as a filter bank (right). Determine M_0, M_1, and M_2.

(b) Compute $\beta^{(1)}(z)$, $\beta^{(2)}(z)$, and $\alpha^{(2)}(z)$ for an input $x[n] = \delta[n] + 2\delta[n-1]$

Question #2: Consider the following synthesis wavelet bank and filter bank.



Let these filters be defined by

$$H(z) = (1/\sqrt{2})(-z^{+1} + 1)$$
$$G(z) = (1/\sqrt{2})(z^{+1} + 1)$$

(a) Use the Noble identities to simplify the analysis wavelet bank (left) diagram and represent it as a filter bank (right). Determine M_0, M_1, and M_2.

(b) Compute $x[n]$ for

$$\beta^{(1)}(z) = \sqrt{2}\left(1 + z^{-1}\right)$$
$$\beta^{(2)}(z) = 0$$
$$\alpha^{(2)}(z) = 2z^{-1}$$