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EE274_ProgEx03

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Also accessible through http://www.github.com/soymarwin/ee274/EE274_ProgEx03

A. The Bilateral Z-Transform

$(a)\ \ x(n) = (\frac{4}{3})^n u(1-n)$

$$x(n) = (\frac{4}{3})^n u(-n+1)$$

$$X(z) = \sum_{n=-\infty}^{\infty} x(n) z^{-n}$$

$$X(z) = \sum_{n=-\infty}^{\infty} (\frac{4}{3})^n u(-n+1) z^{-n}$$

$$Let\ k = -n+1\ and\ n = 1-k$$

$$X(z) = \sum_{n=-\infty}^{\infty} (\frac{4}{3})^{1-k} u(k) z^{k-1}$$

$$X(z) = \sum_{n=0}^{\infty} (\frac{4}{3}) \cdot (\frac{4}{3})^{-k} \cdot z^k \times z^{-1}$$

$$X(z) = (\frac{4z^{-1}}{3}) \sum_{n=0}^{\infty} (\frac{3z}{4})^k$$

$$X(z) = (\frac{4z^{-1}}{3}) \cdot (\frac{1}{1-\frac{3z}{4}}),\ 0 < |z| < \frac{4}{3}$$

$$or\ X(z) = \frac{4z^{-1}}{3-\frac{9z}{4}},\ 0 < |z| < \frac{4}{3}$$

$$or\ X(z) = \frac{16z^{-1}}{12-9z},\ 0 < |z| < \frac{4}{3}$$

$$or\ X(z) = \frac{16}{12z-9z^2},\ 0 < |z| < \frac{4}{3}$$

$(b)\ \ x(n) = 2^{-|n|} + (\frac{1}{3})^{|n|}$

$$X(z) = \sum_{n=0}^{\infty} 2^{-n} z^{-n} + \sum_{n=0}^{\infty} (\frac{1}{3})^n z^{-n}$$

$$X(z) = \sum_{n=0}^{\infty}(\frac{z^{-1}}{2})^n + \sum_{n=0}^{\infty}(\frac{z^{-1}}{3})^n$$

$$X(z) = \frac{1}{1-\frac{z^{-1}}{2}} + \frac{1}{1-\frac{z^{-1}}{3}}$$

$$X(z) = \frac{2z}{2z-1} + \frac{3z}{3z-1}$$

$$X(z) = \frac{z(12z-5)}{(2z-1)(3z-1)}, \ \frac{1}{3} \ < | \, z \, | < \ \frac{1}{2}$$

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