



1 DEFINITIONS

1)

$$u(n) = \begin{cases} 1 & n \geq 0 \\ 0 & n < 0 \end{cases} \quad (1.1)$$

2) The Z transform of X is defined as

$$M_X(z) = E(z^{-X}) = \sum_{k=-\infty}^{\infty} z^{-k} p_X(k) \quad (1.2)$$

2 PROBLEMS

1. If

$$p_Y(n) \xleftrightarrow{Z} M_Y(z), \quad (2.1.1)$$

show that

$$p_Y(n-k) \xleftrightarrow{Z} P_Y(z)z^{-k}, \quad (2.1.2)$$

2. Show that

$$u(n) \xleftrightarrow{Z} \frac{1}{(1-z^{-1})}, \quad |z| > 1 \quad (2.2.1)$$

3. Show that

$$nu(n) \xleftrightarrow{Z} \frac{z^{-1}}{(1-z^{-1})^2}, \quad |z| > 1 \quad (2.3.1)$$

4. Let

$$M_Y(z) = \left\{ \frac{z^{-1}(1-z^{-6})}{6(1-z^{-1})} \right\}^2, \quad |z| > 1 \quad (2.4.1)$$

Show that

$$p_Y(n) = \frac{(n-1)u(n-1) - 2(n-7)u(n-7) + (n-13)u(n-13)}{36} \quad (2.4.2)$$

5. The vertices of a $\triangle ABC$ are

$$\mathbf{A} = \begin{pmatrix} 3 \\ 8 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 6 \\ -6 \end{pmatrix}, \quad (2.5.1)$$

Find the equation of a line perpendicular to BC and passing through \mathbf{A} .