$$x[n] = \delta[n]$$

$$X(K) = \sum_{n=0}^{N-1} x(n) W_N^{kn}, \quad k = 0 \text{ to } N-1$$

$$\delta(n) = 1, \quad n = 0$$

$$X(K) = 1 \cdot W_N^{K(0)}$$

$$\boxed{X(K) = 1}$$

$$X(k) = \sum_{n=0}^{N-1} 1 \cdot W_N^{kn}$$

$$x(n) = 1, \quad =0 \text{ otherwise}$$

$$'(k) = \sum_{n=0}^{N-1} e^{-j\frac{2\pi kn}{N}}, \quad k=0 \text{ to } N-1$$

$$\boxed{\text{Case2:}} \quad \underline{\underline{k \neq 0}}$$

$$\underline{\text{Case1:}} \quad \underline{\underline{k=0}}$$

$$X(k) = \sum_{n=0}^{N-1} 1$$

$$\boxed{X(k) = N}$$

$$X(K) = \sum_{n=0}^{N-1} a^n . W_N^{; k=0 \text{ to } N-1}$$

$$= \sum_{n=0}^{N-1} (a . W_N^k)^n$$

$$= \frac{1 - (a . W_N^k)^N}{1 - (a . W_N^k)}$$

$$W_N^{KN} = e^{-j\frac{2\pi}{N} K N}$$

$$W_N^{KN} = 1$$

$$\boxed{\sum_{n=0}^{N-1} a^n = \frac{1 - a^N}{1 - a}}$$

$$\boxed{X(K) = \frac{1 - a^N}{1 - a . e^{-j\frac{2\pi}{N} k}}} \quad K = 0 \text{ to } N-1$$

You