Example Problem 1

If in a sample there are 95% non-zero values, calculate X_{10}.

Solution:

$$k = 0.95 = P\left[X \neq 0\right], \quad P\left[X \geq x_{10}\right] = \frac{1}{10} = 0.1$$

$$F(x_{10}) = 1 - 0.1 = 0.9 \Rightarrow \; 0.9 = 1 - 0.95 + 0.95 F^{*}(x_{10})$$

$F^{*}(x) = 0.895$ **=** $P\left[X \leq x_{10} \mid X \neq 0\right]$ ***given x*** $\neq$ ***0***

If $F^{*}(x)$ ***follows a normal distribution N (10,15***^{2} ***) given***

$F^{*}(x) = 0.895$**=** $P\left[Z \leq z\right]$

Get z value corresponding to 0.895 $\therefore$ ***z = 1.255***

or $\dfrac{x_T - \bar{x}}{\sigma} = 1.255$ *or* $x_t = 1.255 \times \sqrt{15} + 10 = 28.33$ ***units***

Example Problem 2

Peak flow data are available for 75 yrs, 20 of the values are zero and the remaining 55 values have a mean of 100 units and std. deviation of 35.1 units and are log normally distributed. Estimate the probability of the peak exceeding 125 units using frequency analysis.

$k = \frac{55}{75} = 0.733$ P[X $\neq$ 0]

$P\left[X > 125\right] = 1 = 1 - F(125) \quad \because F(x) = 1 - k + kF^*(x)$

$F^*(X_T) = F^*(125)$ log-normally distributed

$= P\left[X \leq 125 / X \neq 0\right]$

K_T table, frequency table

For normal dist. it is K_T = S

$X_T = \overline{X}\left(1 + K_T C_V\right)$ For log-normal dist.

Example Problem 2 Contd…

$$or \quad 125 = 100(1 + 0.351K_T)$$

$$C_V = CoV = \frac{S}{\overline{X}} = 35.1/100 = 0.351$$

$$or \quad K_T = 0.712$$

$$\therefore P[X \geq X_T] = 0.21 = 0.79$$

But we are interested in F(x)

$$= 1 - 0.733 + 0.733 \times 0.79$$
$$= 0.846$$

$$P\left[X \geq X_T\right] = 1 - 0.846 = 0.154 \quad (Ans)$$