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Risk, Reliability and Log-Pearson Distribution Formulas

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List of 19 Risk, Reliability and Log-Pearson Distribution Formulas

Risk, Reliability and Log-Pearson Distribution



Log-Pearson Type III Distribution

1) Adjusted Coefficient of Skew

$$fx \quad C'_s = C_s \cdot \left(\frac{1 + 8.5}{N} \right)$$

[Open Calculator](#)

$$ex \quad 0.004349 = 1.2 \cdot \left(\frac{1 + 8.5}{2621} \right)$$

2) Coefficient of Skew of Variate Z given Adjusted Coefficient of Skew

$$fx \quad C_s = \frac{C'_s}{\frac{1+8.5}{N}}$$

[Open Calculator](#)

$$ex \quad 1.200142 = \frac{0.00435}{\frac{1+8.5}{2621}}$$



3) Equation for Base Series of Z Variates

$$fx \quad z_m = \log_{10}(z)$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$ex \quad 0.78533 = \log_{10}(6.1)$$

4) Equation for Z Series for any Recurrence Interval

$$fx \quad Z_t = z_m + K_z \cdot \sigma$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$ex \quad 9.52 = 0.77 + 7 \cdot 1.25$$

5) Frequency Factor given Z Series for Recurrence Interval

$$fx \quad K_z = \frac{Z_t - z_m}{\sigma}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$ex \quad 6.984 = \frac{9.5 - 0.77}{1.25}$$

6) Mean Series of Z Variates given Z Series for Recurrence Interval

$$fx \quad z_m = Z_t - K_z \cdot \sigma$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$ex \quad 0.75 = 9.5 - 7 \cdot 1.25$$




7) Partial Duration Series 

$$fx \quad T_P = \frac{1}{(\ln(T_A)) - (\ln(T_A - 1))}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95_img.jpg\)](#)

$$ex \quad 19.49573 = \frac{1}{(\ln(20)) - (\ln(20 - 1))}$$

8) Sample Size given Adjusted Coefficient of Skew 

$$fx \quad N = C_s \cdot \frac{1 + 8.5}{C'_s}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2_img.jpg\)](#)


$$ex \quad 2620.69 = 1.2 \cdot \frac{1 + 8.5}{0.00435}$$

Risk, Reliability and Safety Factor 9) Actual Value of Parameter Adopted in Design of Project given Safety Factor 

$$fx \quad C_{am} = SF_m \cdot C_{hm}$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

$$ex \quad 6 = 3 \cdot 2$$


10) Equation for Risk 

$$fx \quad R = 1 - (1 - p)^n$$

[Open Calculator !\[\]\(c1168d6a8b365d11e842ece304635fa7_img.jpg\)](#)

$$ex \quad 0.064705 = 1 - (1 - 0.006667)^{10}$$




11) Equation for Risk given Return Period 

$$fx \quad R = 1 - \left(1 - \left(\frac{1}{T_r} \right) \right)^n$$

Open Calculator 


$$ex \quad 0.064702 = 1 - \left(1 - \left(\frac{1}{150} \right) \right)^{10}$$

12) Equation for Safety Factor 

$$fx \quad SF_m = \frac{C_{am}}{C_{hm}}$$

Open Calculator 


$$ex \quad 3 = \frac{6}{2}$$

13) Equation for Safety Margin 

$$fx \quad S_m = C_{am} - C_{hm}$$

Open Calculator 

$$ex \quad 4 = 6 - 2$$

14) Probability given Return Period 

$$fx \quad p = \frac{1}{T_r}$$

Open Calculator 

$$ex \quad 0.006667 = \frac{1}{150}$$



15) Reliability given Risk

$$fx \quad R_e = 1 - R$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$ex \quad 0.935295 = 1 - 0.064705$$

16) Reliability using Return Period

$$fx \quad R_e = \left(1 - \left(\frac{1}{T_r} \right) \right)^n$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$ex \quad 0.935298 = \left(1 - \left(\frac{1}{150} \right) \right)^{10}$$

17) Return Period given Probability

$$fx \quad T_r = \frac{1}{p}$$

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

$$ex \quad 149.9925 = \frac{1}{0.006667}$$

18) Risk given Reliability

$$fx \quad R = 1 - R_e$$

[Open Calculator !\[\]\(5abce1a84a655b073239ab33e1199487_img.jpg\)](#)

$$ex \quad 0.1 = 1 - 0.9$$



19) Value of Parameter obtained from Hydrological Considerations given Safety Factor

[Open Calculator !\[\]\(feabb98897b440bc8695a03336a6e2df_img.jpg\)](#)

$$\text{fx } C_{hm} = \frac{C_{am}}{SF_m}$$

$$\text{ex } 2 = \frac{6}{3}$$



Variables Used

- C_{am} Actual Value of the Parameter
- C_{hm} Value of Parameter
- C_s Coefficient of Skew of Variate Z
- C'_s Adjusted Coefficient of Skew
- K_z Frequency Factor
- n Successive Years
- N Sample Size
- p Probability
- R Risk
- R_e Reliability
- S_m Safety Margin
- SF_m Safety Factor
- T_A Annual Series
- T_P Partial Duration Series
- T_r Return Period
- z Variate 'z' of a Random Hydrologic Cycle
- z_m Mean of Z Variates
- Z_t Z Series for any Recurrence Interval
- σ Standard Deviation of the Z Variate Sample



Constants, Functions, Measurements used

- **Function:** **ln**, $\ln(\text{Number})$
Natural logarithm function (base e)
- **Function:** **log10**, $\log_{10}(\text{Number})$
Common logarithm function (base 10)



Check other formula lists

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- [Gumbel's Method for Prediction of Flood's Peak Formulas](#) 
- [Rational Method to Estimate the Flood Peak Formulas](#) 
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