gerar variáveis correlacionadas:

1º) gerar números aleatórios $N(0,1)$. ok! → $\underset{\sim}{y}_k$

2º) Matriz de correlação $\underset{\sim}{R}_Z = [\rho_{ij}]$ ✓

3º) Decomposição de Cholesky da matriz de correlação $\underset{\sim}{L} \longrightarrow \underset{\sim}{J}_{ZY}$

4º) gerar um vetor normal correlacionado $\underset{\sim}{z}_k$

$$\underset{\sim}{z}_k = \underset{\sim}{L}\, \underset{\sim}{y}_k = \underset{\sim}{J}_{ZY} \cdot \underset{\sim}{y}_k$$

5º) Calcular as probabilidades acumuladas do vetor $\underset{\sim}{z}_k$:

$$\underset{\sim}{u}_k = \Phi(\underset{\sim}{z}_k)$$

6º) Cálculo das variáveis com distribuição $F_X(\underset{\sim}{x})$

$$\underset{\sim}{x}_k = F_X^{-1}(\underset{\sim}{u}_k)$$

gumbel

$$\overbrace{F_{X_m}(x_m)}^{u_k} = \exp\left[-e^{-\alpha_m(x_m-u_m)}\right]$$

$$\ln u_k = -\exp\left[-\alpha_m(x_m-u_m)\right]$$

$$\ln\left[\ln\left(\frac{1}{u_k}\right)\right] = -\alpha_m(x_m-u_m)$$

$$x_m = u_m - \frac{1}{\alpha_m}\cdot\ln\left[\ln\left(\frac{1}{u_k}\right)\right]$$

Weibull

$$\underbrace{F_{X_1}(x_1)}_{u_k} = 1 - \exp\left[\left(\frac{x_1-\varepsilon}{w_1-\varepsilon}\right)^k\right]$$

$$\ln(1-u_k) = \left[\frac{(x_1-\varepsilon)}{(w_1-\varepsilon)}\right]^k$$

$$x_1 = \left[\ln(1-u_k)\right]^{\frac{1}{k}}(w_1-\varepsilon)$$

Frechet

$$\underbrace{F_{X_n}(x_n)}_{\mu_k} = \exp\left[-\left(\frac{v_n}{x_n}\right)^k\right]$$

$$\ln(\mu_k) = -\left(\frac{v_n}{x_n}\right)^k$$

$$\left[\ln\left(\frac{1}{\mu_k}\right)\right]^{1/k} = \frac{v_n}{x_n}$$

$$x_n = \frac{v_n}{\left[\ln\left(\frac{1}{\mu_k}\right)\right]^{1/k}}$$

Lognormal

$$z_{fe} = \frac{\ln x_{fe} - \lambda_x}{\xi_x}$$

$$z_{fe} \cdot \xi_x + \lambda_x = \ln x_{fe}$$

$$x_{fe} = np.exp\,(\lambda_x + z_{fe}\,\xi_x)$$

Normal

$$x_n = \mu_x + z_n \cdot \sigma_x$$