

# LECTURE NOTES

## NON LIFE INSURANCE

**First Draft**

Prof. Dr. Ricardo Gatto

SWITZERLAND-SPAIN-ECUADOR

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# 1. Individual Risk and Distributions

A non negative random variable is called a **loss** and its distribution a **loss distribution**.

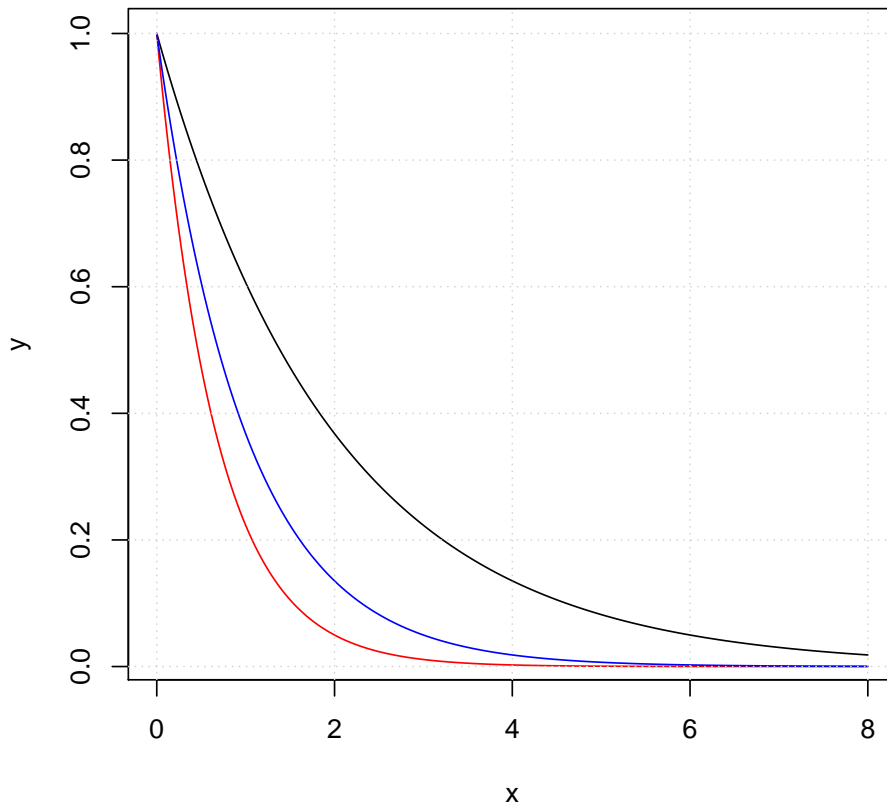
$X \sim \text{Exponential}(\alpha)$  means that  $X$  has density  $f_X(x) = \alpha e^{-\alpha x}$  and distribution function (d.f)  $F_X(x) = 1 - e^{-\alpha x} \forall x > 0$  and  $\alpha > 0$ .

Let  $Y = e^x$ ,

$$\begin{aligned} F_Y(Y) &= F_X(\log Y) \\ &= 1 - e^{-\alpha \log(y)} \\ &= 1 - y^{-\alpha} \end{aligned}$$

Is called the **Pareto Distribution**. If  $Y$  follows a Pareto distribution, denoted  $Y \sim \text{Pareto}(\alpha)$

Exponential distribution with parameter  $\alpha$



$X \sim \text{Exponential}(\lambda)$  and  $Y \sim X^{\frac{1}{\tau}} \forall \tau > 0$

$$\begin{aligned} F_Y(Y) &= F_X(Y^\tau) \\ &= 1 - e^{-\lambda y^\tau} \quad \forall y > 0 \end{aligned}$$

$Y$  follows the **Weibull distribution**,  $\tau$  is called the Weibull index. It is denoted by  $Y \sim \text{Weibull}(\tau, \lambda)$