Construction of fuzz. nbers via CDF

prop 4 : $F_x : \mathbb{R} \to \mathbb{R}$ is a CDF then

$$A_{(x)} = \begin{cases} \dfrac{F_x(x)}{F_x(a)} & \text{if } x \leq a \\[2mm] \dfrac{1 - F_x(x)}{1 - F_x(a)} & \text{if } x \geq a \end{cases} \qquad x, a \in \mathbb{R}$$

The choice of $a \in \mathbb{R}$ can be a measure of location.

eg. <u>Uniform distribution</u>

$$F_{(x)} = \begin{cases} 0 & \text{for } x > a \\[2mm] \dfrac{x-a}{b-a} & \text{for } a < x < b \\[2mm] 1 & \text{for } x > b \end{cases}$$

Uniform : mean: $(a+b)/2$
variance : $(b-a)^2 / 12$

To get a fuzzy number "close to μ", we have :

$$A(x) = \begin{cases} 2F(x) & \text{if } x \leq \mu \\ 2(1 - F(x)) & \text{if } x \geq \mu \end{cases} \quad x \in \mathbb{R}$$

(membership fct. of fuzzy x)