DIGAMMA FUNCTION and CTNT EULER-MASCHERONI:

Γ (s+ 2)= (s+1).(s). Γ (s)

function : Ψ (s)=$\frac{\Gamma'(s)}{\Gamma(s)}$

Ψ (s+1)= $\frac{\Gamma'(s+1)}{\Gamma(s+1)}$= $\frac{s.\Gamma'(s)+\Gamma(s)}{s.\Gamma(s)}$= Ψ (s)+$\frac{1}{s}$

Ψ (s+1)= - γ+ $\sum_{l=1}^{\infty}(\frac{1}{l}-\frac{1}{l+s})$

$\Gamma'(s)$ =[Ψ (s+1)- $\frac{1}{s}$]. Γ (s)

$\frac{d}{ds}(s+1)!$ =[2s+1)]. Γ (s)+[s.(s+1)]. Γ ' (s)=

=(2s+1). Γ (s)+ [s.(s+1)].([Ψ (s+1)- $\frac{1}{s}$] .Γ (s)) =

=(2s+1). Γ (s)+ [s.(s+1)](- $\frac{1}{s}$. Γ (s) + Γ (s). Ψ (s+1))=

= Γ (s)[(2s+ 1)-(s+ 1)+ Ψ (s+1)]

Γ(0), Γ(-1), Γ(-2) …∄ $\Gamma'(1) = -\gamma$

Ψ (s)= - $\frac{1}{s}-\gamma+\sum_{m=1}^{\infty}\left(\frac{1}{m}-\frac{1}{m+s}\right)$

Γ' (s)= (s-1)!. [H $_{s-1}$ - γ]= s!. [H $_{s}$ - γ]

While by definition :

γ= $\lim_{m\to\infty}(H_s - Ln(m))$

And the series Harmonica it is H_s= $\sum_{s=1}^{s}(\frac{1}{s})$

In others words , including the works by Armengol Gasull , we see the gamma constant γ in another perspective

“n” measurements →“n” results: x_1, x_2, x_3, x_i … x_n

E(Y_i)= x_i . $p_i + 0.(1 - p_i)$= $x_i . p_i$= x_{and} .($1/i$),

in the case “i=2” and assuming that x_i =1 (and so on from “1” to “n”)

We measure the total probability density : S(p_{total}) or Shannon entropy :

S(p_{total})= - $\sum_{i=1}^{n} p_i . Ln(p_i)$=$-\sum_{i=1}^{m} \frac{1}{n_i} ln n_i$

Knowing that $\sum_{n=1}^{m} E(Y_n)$ =$x_1 . p_1$+$x_2 . p_2$ +$x_3 p_3 + - \cdots +$ $x_m . p_m$

We define , as we have already done, studied previously , that

$\lim_{m\to\infty} (\sum_{n=1}^{m} H_n - Ln(m)) = γ$

S(p_{total})= - $\sum_{i=1}^{n} p_i . Ln(p_i)$=$-\sum_{i=1}^{m} \frac{1}{n_i} ln n_i$

p_i=1/n_i

Taking out logarithms to E(Y_i)= $x_i . p_i$we will obtain

Ln [E(Y_i)] = Ln $(x_i) + Ln(p_i)$

which, deriving , we obtain

$\frac{d}{dx}$ Ln[E(Y_i)]= $\frac{1}{x_i}$ dx + $\frac{d}{dx}$ ln ($\frac{1}{n_i}$)=$\frac{1}{x_i}$ dx + $\frac{d}{dx}$ (−ln (n_i)

if we now integrate again :

Ln[E(Y_i)]= $\int_1^m \frac{1}{x_i}$ - Ln(m_i)

Ln[E(Y_i)]= $\lim_{m\to\infty} (\sum_{i=1}^{m} \frac{1}{x_i}$- Ln($m_i$))