we should not confuse between the Similar equations

$\Gamma(n)$different from $\Gamma(S)$

$$\Gamma(n) = (n-1)!$$

<u>Another</u> $\Gamma(S)$ or $\Gamma(t)$ *or* $\Gamma(x)$

$$\Gamma(S)\Gamma(1-S) = \left(\frac{\pi}{\sin \pi\, s}\right)$$

When a circle's radius is ½ , called a unit circle , its circumference is π.

$r = \frac{1}{2}$

Circumference(1) = $2 * \frac{1}{2}\pi = \pi$

Circumference(2) = 2(π) *π = 2π π

Circumference(3) = 2(2π π) *π = 4π π π

Circumference(t) = $\frac{(2\pi)^t}{2}$ when t = 1,2,3,----

<u>Dividing</u> $\frac{(2\pi)^t}{2}$ *by* $\cos\frac{\pi\, t}{2}$ OR $\sin\frac{\pi\, t}{2}$

we can have the equation $\left(\frac{(2\pi)^t}{2}\right)$in any desired level

$$f(\mathrm{t}) = \frac{1}{2}\,\frac{(2\pi)^{\mathrm{t}}}{\cos\frac{\pi\, t}{2}}$$

$$f(\mathrm{t}) = \frac{2^{\mathrm{t}-1}\,\pi^{\mathrm{t}}}{\cos\frac{\pi\, t}{2}}$$

we will call this part of equation $f(\mathrm{t})$ = “ $\Gamma(t)$“

$$\Gamma(t) = \frac{2^{\mathrm{t}-1}\,\pi^{\mathrm{t}}}{\cos\frac{\pi\, t}{2}} \quad \text{------(1)}$$

Compensation in the equation NO. (1)for the value t = (1 − *t*)

$$\Gamma(1-t) = \frac{2^{-\mathrm{t}}\,\pi^{1-\mathrm{t}}}{\cos\frac{\pi\,(1-t)}{2}} \quad \text{-------(2)}$$

equation(1) ∗ equation(2)

$$\Gamma(t)\,\Gamma(1-t) = \frac{2^{\mathrm{t}-1}\,\pi^{\mathrm{t}}}{\cos\frac{\pi\, t}{2}}\;\frac{2^{-\mathrm{t}}\,\pi^{1-\mathrm{t}}}{\cos\frac{\pi\,(1-t)}{2}}$$

$$\Gamma(t)\,\Gamma(1-t) = \frac{2^{\mathrm{t}}\;2^{-\mathrm{t}}\quad \pi^{\mathrm{t}}\;\pi^{-\mathrm{t}}\quad \pi^{1}}{2\cos\frac{\pi\, t}{2}\quad \cos\frac{\pi\,(1-t)}{2}}$$

t = S

$$\frac{\mathbf{1}}{\mathbf{2}}\,\mathbf{\sin \pi s} = \mathbf{\cos\frac{\pi\, s}{2}}\cos\frac{\pi\,(1-s)}{2}$$

$$\boldsymbol{\Gamma(s)\,\Gamma(1-s) = \frac{\pi}{\sin \pi S}}$$