

# we should not confuse between the Similar equations

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

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

Another  $\Gamma(S)$  or  $\Gamma(t)$  or  $\Gamma(x)$

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

When a circle's radius is  $\frac{1}{2}$ , called a unit circle, its circumference is  $\pi$ .

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

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

$$\text{Circumference}(2) = 2(\pi) * \pi = 2\pi \pi$$

$$\text{Circumference}(3) = 2(2\pi \pi) * \pi = 4\pi \pi \pi$$

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

Dividing  $\frac{(2\pi)^t}{2}$  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

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

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

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

we will call this part of equation  $f(t) = \Gamma(t)$

Compensation in the equation NO. (1) for the value  $t = (1 - t)$

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

equation(1) \* equation(2)

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

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

$t = S$

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

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

