

R règle de terme de $\sum_{n \geq 0} a_n t^n$.

On a :

$$\mathcal{F}[\mathcal{XG}] = \mathcal{R}_1 \mathcal{R} \left[\int_0^x \left(\sum_{n=0}^{+\infty} a_n t^n \right) dt \right] = \sum_{n=0}^{+\infty} \left(\int_0^x a_n t^n dt \right)$$

C'est le Cours

$$\left. \begin{aligned} & \{ \} + f) - 1, 1 [, \sum_{n=0}^{+\infty} t^n = \frac{1}{1-t} \quad (R=1) \end{aligned} \right\}$$

\Downarrow Cons

$$f(x) = 1, 1 [, \int_0^x \left(\sum_{n=0}^{+\infty} t^n \right) dt = \sum_{n=0}^{+\infty} \left(\int_0^x t^n dt \right)$$

$$\dots , \int_0^x \frac{1}{1-t} dt = \sum_{n=0}^{+\infty} \frac{x^{n+1}}{n+1}$$

$$f(x) = 1, 1 [, - \ln(1-x) = \sum_{n=1}^{+\infty} \frac{x^n}{n}$$

$$\forall x \in]-1, 1[\quad , \quad \sum_{n=0}^{+\infty} (-1)^n x^n = \frac{1}{1+x} \quad (R=1)$$

⇓ Cows

$$\forall x \in]-1, 1[\quad , \quad \int_0^x \left(\sum_{n=0}^{+\infty} (-1)^n t^n \right) dt = \sum_{n=0}^{+\infty} \left(\int_0^x (-1)^n t^n dt \right)$$

$$\int_0^x \frac{1}{1+t} dt = \sum_{n=0}^{+\infty} (-1)^n \frac{x^{n+1}}{n+1}$$

$$\forall x \in]-1, 1[\quad , \quad \ln(1+x) = \sum_{n=1}^{+\infty} (-1)^{n-1} \frac{x^n}{n}$$

$(-1)^{n+1} = (-1)^{n-1}$

NB
(Dna.)

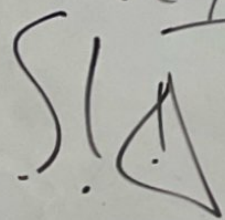
$$\forall t \in]-1, 1[, \sum_{n=0}^{+\infty} t^{2n} = \frac{1}{1-t^2} \quad (R=1)$$

$$\forall x \in]-1, 1[, \int_0^x \left(\sum_{n=0}^{+\infty} t^{2n} \right) dt = \sum_{n=0}^{+\infty} \left(\int_0^x t^{2n} dt \right)$$

$$\int_0^x \frac{1}{1-t^2} dt = \sum_{n=0}^{+\infty} \frac{x^{2n+1}}{2n+1}$$

$$\forall x \in]-1, 1[, \operatorname{arctanh}(x) = \sum_{n=0}^{+\infty} \frac{x^{2n+1}}{2n+1}$$

Rappel:



$$\int \frac{1}{1-t^2} dt = \operatorname{arctanh}(x) + C$$

$$\forall t \in]-1, 1[, \sum_{n=0}^{+\infty} (-1)^n t^{2n} = \frac{1}{1+t^2} \quad (R=1)$$

\Downarrow Conv

$$\forall x \in]-1, 1[, \int_0^x \left(\sum_{n=0}^{+\infty} (-1)^n t^{2n} \right) dt = \sum_{n=0}^{+\infty} \left(\int_0^x (-1)^n t^{2n} dt \right)$$

$$\dots \int_0^x \frac{1}{1+t^2} dt = \sum_{n=0}^{+\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$$

$$\forall x \in]-1, 1[, \arctan(x) = \sum_{n=0}^{+\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$$

\leftarrow primitive NON PAS intégrale

Rappel:

$$\int \frac{1}{1+t^2} dt = \arctan(t) + C$$

Qnc: $\forall x \in \mathbb{R}, e^x = \sum_{n=0}^{+\infty} \frac{x^n}{n!}$

$\text{Ch}(x) = \sum_{n=?}^{+\infty} ?$

$\text{Sh}(x) = \sum_{n=?}^{+\infty} ?$

$$0 \leq k \leq n$$

$$\binom{x^n}{k} = n(n-1)\dots(n-k+1)x^{n-k}$$

$$\binom{x^n}{k} = \frac{n!}{(n-k)!} x^{n-k}$$

advice :

→ Il faut savoir le n et trouver
(souvenir avec le temps)

$$(x^n)' = n x^{n-1}$$

$$(x^n)^{(2)} = n(n-1) x^{n-2}$$

↓ On conjecture

$$(x^n)^{(k)} = n(n-1)\dots(n-k+1) x^{n-k}$$

$$0 \leq k \leq n$$

$$(x^n)^{(k)} = n(n-1)\dots(n-k+1) x^{n-k}$$

$$(x^n)^{(k)} = \frac{n!}{(n-k)!} x^{n-k}$$

advice:

→ Il faut savoir le redoubler
(souvenir avec le temps)

$$\binom{\binom{n}{n}}{\binom{n}{n}} = ?$$

Rép

$$\binom{\binom{n}{n}}{\binom{n}{n}} = n!$$