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ABSTRACT

Je présente dans ce petit article quelques de mes innombrables de formules qui j'ai trouvées sur pi

1) Formule 01:

$$u_{n+1} = \frac{\sqrt{2u_n + 2}}{2}, \quad u_0 = \frac{1}{2} \; ; \quad n \to \infty \quad ; \quad a_n \to \pi$$

$$\begin{aligned} a_{n+1} = -\frac{2^n\sqrt{1-{u_n}^2}}{278277680055375}(&15876096{u_n}^{20} - 3668213760{u_n}^{18} + 49268817920{u_n}^{17} - 356011130880{u_n}^{16} \\ &+ 1748427175936{u_n}^{15} - 6410248519680{u_n}^{14} + 18487966817280{u_n}^{13} - 43434278092800{u_n}^{12} \\ &+ 85359083280640{u_n}^{11} - 143596788056064{u_n}^{10} + 211489806220160{u_n}^{9} - 279324483092480{u_n}^{8} \\ &+ 339690775411440{u_n}^{7} - 391224805949440{u_n}^{6} + 438519427840536{u_n}^{5} - 489822715822080{u_n}^{4} \\ &+ 556130833303710{u_n}^{3} - 655609664143360{u_n}^{2} + 834826372205805u_n - 1311352354095104) \end{aligned}$$

2) Formules 2, 3, 4, 5 :

$$\begin{cases} u_{n+1} = \frac{1}{2}\sqrt{(2+2u_n)} \ ; \ u_0 = -1 \\ a_n = 2^{4n+5}\left(3 - 2\sqrt{(2+2u_n)} + u_n\right) \\ n \to \infty \ ; \ a_n \to \pi^4 \end{cases}$$

$$\begin{cases} u_{n+1} = \frac{1}{2}\sqrt{(2+2u_n)} \ ; \ u_0 = -1 \\ a_n = \frac{2^{2n+2}}{3}\left(\sqrt{(2+2u_n)} - 2u_n\right) \\ n \to \infty \ ; \ a_n \to \pi^2 \end{cases}$$

$$\begin{cases} u_{n+1} = \frac{1}{2}\sqrt{(2+2u_n)} \ ; \ u_0 = 0 \\ a_n = 2^{3n+4}\sqrt{(1-u_n{}^2)}(1-u_n) \\ n \to \infty \ ; \ a_n \to \pi^3 \end{cases}$$

$$\pi = \frac{6}{\sqrt{3}}\sum_{n=0}^{\infty}\frac{1}{3^n}\left(\frac{1}{2n+1} - \frac{2}{3\times 3^n}\frac{(-1)^n}{4n+3} - \frac{4}{27\times 3^{3n}}\frac{1}{8n+7}\right)$$

3) Formule 6 :

$$a_n = 2^{20n+108}\left(19 \times 488462349375 + \frac{1}{91842371397567}u_n - \frac{2 \times 19}{19970074233}\sqrt{2+2u_n} + \frac{19 \times 2^5}{4570857}\sqrt{2+\sqrt{2+2u_n}} - \frac{19 \times 2^{11}}{17577}\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}\right.$$

$$+ \frac{19 \times 13 \times 2^{19}}{14229}\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}} - \frac{13 \times 19 \times 2^{29}}{14229}\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}}}$$

$$+ \frac{19 \times 2^{41}}{17577}\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}}}} - \frac{19 \times 2^{55}}{4570857}\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}}}}$$

$$\left.+ \frac{19 \times 2^{71}}{19970074233}\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}}}}} - \frac{2^{89}}{91842371397567}\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+\sqrt{2+2u_n}}}}}}}}\right)$$

$$u_{n+1} = \frac{\sqrt{2+2u_n}}{2}\,;\ u_0 = -1\,;\ a_n \to \pi^{20}$$

4) Formule 7:

$$a_n = 2^{40n+380}\left(40! + \frac{2^{38}u_n}{5712428025154202733704185140101035016538362213231986106866978999556657197537 35}\right.$$

$$- \frac{2^{40}u_{n+1}}{623450762778700783288165457584252056963069184180940837505441998 7435}$$

$$+ \frac{2^{44}\times 13\times 19\times 37u_{n+2}}{124369031715849832390401075938776490494157921083949410124147 85}$$

$$- \frac{2^{50}\times 13\times 19\times 37u_{n+3}}{4560715168804518737292219685548998456033207984811238 5}$$

$$+ \frac{2^{58}\times 13\times 19\times 37u_{n+4}}{270777933373099707854589383972246197578663526 5} - \frac{2^{68}\times 13\times 19\times 37u_{n+5}}{257981779145694133155922473370591489126 5}$$

$$+ \frac{2^{80}\times 19\times 29\times 37u_{n+6}}{877925590155710208392312332303627 05} - \frac{2^{94}\times 19\times 29\times 37u_{n+7}}{214324223367053623663557717259 05}$$

$$+ \frac{2^{110}\times 13\times 19\times 29\times 37u_{n+8}}{108834865452149340607655272348 5} - \frac{2^{128}\times 13\times 23\times 29\times 37u_{n+9}}{82341873462160464812312928345} + \frac{2^{148}\times 13\times 23\times 29\times 37u_{n+10}}{82341873462160464812312928345}$$

$$- \frac{2^{170}\times 13\times 19\times 29\times 37u_{n+11}}{108834865452149340607655272348 5} + \frac{2^{194}\times 19\times 29\times 37u_{n+12}}{214324223367053623663557717259 05}$$

$$- \frac{2^{220}\times 19\times 29\times 37u_{n+13}}{877925590155710208392312332303627 05} + \frac{2^{248}\times 13\times 19\times 37u_{n+14}}{257981779145694133155922473370591489126 5}$$

$$- \frac{2^{278}\times 13\times 19\times 37u_{n+15}}{270777933373099707854589383972246197578663526 5}$$

$$+ \frac{2^{310}\times 13\times 19\times 37u_{n+16}}{4560715168804518737292219685548998456033207984811238 5}$$

$$- \frac{2^{344}\times 13\times 19\times 37u_{n+17}}{124369031715849832390401075938776490494157921083949410124147 85}$$

$$+ \frac{2^{380}u_{n+18}}{623450762778700783288165457584252056963069184180940837505441998 7435}$$

$$\left.- \frac{2^{418}u_{n+19}}{5712428025154202733704185140101035016538362213231986106866978999556657197537 35}\right)$$

$$u_{n+1} = \frac{\sqrt{2+2u_n}}{2}\,;\; u_{n+2} = \frac{\sqrt{2+2u_{n+1}}}{2}\,;\; \ldots\,;\; u_{n+19} = \frac{\sqrt{2+2u_{n+18}}}{2}\,;\; u_0 = -1\,;\;\; a_n \to \pi^{40}$$

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