formulas used by Pi-chuck

Paul TAVENEAUX

November 28, 2023

.1 Original formula

$$\frac{1}{\pi} = \frac{1}{426880\sqrt{10005}} \sum_{k=0}^{\infty} \frac{(-1)^k (6k)!(13591409 + 545140134k)}{(3k)!(k!)^3 640320^{3k}}$$

.2 π in terms of a and b

$$\frac{1}{\pi} = \frac{1}{426880\sqrt{10005}} \left[13591409 \sum_{k=0}^{\infty} \frac{(-1)^k (6k)!}{(3k)!(k!)^3 640320^{3k}} + 545140134 \sum_{k=0}^{\infty} \frac{(-1)^k (6k)!k}{(3k)!(k!)^3 640320^{3k}} \right]$$

$$\pi = \frac{426880\sqrt{10005}}{1359140a + 545140134b}$$

with

$$a = \sum_{k=0}^{\infty} \frac{(-1)^k (6k)!}{(3k)!(k!)^3 640320^{3k}}$$

$$\text{and} \quad b = \sum_{k=0}^{\infty} \frac{(-1)^k (6k)!k}{(3k)!(k!)^3 640320^{3k}}$$

.3 π in terms of a_k and b_k

let $(a_n)_{n\in\mathbb{N}}$ be a series such that:

$$\forall n \in \mathbb{N}, a_n = \frac{(-1)^k (6k)!k}{(3k)!(k!)^3 640320^{3k}}.$$

it then follows that :

$$a = \sum_{k=0}^{\infty} a_k.$$

let $(b_n)_{n\in\mathbb{N}}$ be a series defined by:

$$\forall n \in \mathbb{N},\ b_n = n * a_n.$$

It then follows that:

$$b = \sum_{k=0}^{\infty} b_k.$$

.4 recursive definition of the a_ns and b_ns

$$\{ a_0 =$$