π^2 results

The following results are Polynomial Continued Fractions of π^2. For the results marked as "new and unproven", we have not found any formal proof yet.

Novelty	Formula	Polynomials	Convergence $[\frac{digits}{term}]$
known	$\frac{30}{\pi^2} = 3 + \cfrac{1}{25+\cfrac{16}{69+\cfrac{81}{135+\cfrac{256}{223+\cfrac{625}{\ddots}}}}}$	$a_n = 11n(n+1)+3,\ b_n = n^4$	2.069
new and proven [1]	$\frac{8}{\pi^2} = 1 - \cfrac{2\cdot1^4-1^3}{7-\cfrac{2\cdot2^4-2^3}{19-\cfrac{2\cdot3^4-3^3}{37-\cfrac{2\cdot4^4-4^3}{\ddots}}}}$	$a_n = 3n(n+1)+1,\ b_n = -(2n-1)n^3$	0.30241
new and unproven	$\frac{16}{4+\pi^2} = 1 - \cfrac{2\cdot1^4-3\cdot1^3}{7-\cfrac{2\cdot2^4-3\cdot2^3}{19-\cfrac{2\cdot3^4-3\cdot3^3}{37-\cfrac{2\cdot4^4-3\cdot4^3}{\ddots}}}}$	$a_n = 3n(n+1)+1,\ b_n = -2n^4+3n^3$	0.3111
new and unproven	$\frac{24}{\pi^2} = 2 + \cfrac{8\cdot1^4}{16+\cfrac{8\cdot2^4}{44+\cfrac{8\cdot3^4}{86+\cfrac{8\cdot4^4}{142+\cfrac{8\cdot5^4}{\ddots}}}}}$	$a_n = 7n(n+1)+2,\ b_n = 8n^4$	0.89405
new and proven [1]	$\frac{18}{\pi^2} = 2 - \cfrac{4\cdot1^4-2\cdot1^3}{13-\cfrac{4\cdot2^4-2\cdot2^3}{34-\cfrac{4\cdot3^4-2\cdot3^3}{65-\cfrac{4\cdot4^4-2\cdot4^3}{\ddots}}}}$	$a_n = n(5n+6)+2,\ b_n = -4n^4+2n^3$	0.60045
new and unproven	$\frac{16}{-4+\pi^2} = 3 - \cfrac{3}{13-\cfrac{48}{29-\cfrac{225}{51-\cfrac{672}{79-\cfrac{1575}{\ddots}}}}}$	$a_n = n(3n+7)+3,\ b_n = -(n+1)^2(n+3)(2n+1)$	0.3082
new and unproven	$\frac{32}{\pi^2} = 3 + \cfrac{3}{13-\cfrac{16}{29-\cfrac{135}{51-\cfrac{480}{79-\cfrac{1225}{\ddots}}}}}$	$a_n = n(3n+7)+3,\ b_n = -n^2(n+2)(2n-3)$	0.31674
new and unproven	$\frac{16}{-8+\pi^2} = 9 - \cfrac{9}{23-\cfrac{96}{43-\cfrac{375}{69-\cfrac{1008}{101-\cfrac{2205}{\ddots}}}}}$	$a_n = n(3n+11)+9,\ b_n = -n(n+2)^2(2n-1)$	0.31384
new and unproven	$\frac{16}{12-\pi^2} = 9 - \cfrac{27}{23-\cfrac{160}{43-\cfrac{525}{69-\cfrac{1296}{101-\cfrac{2695}{\ddots}}}}}$	$a_n = n(3n+11)+9,\ b_n = -n(n+2)^2(2n+1)$	0.3052
new and unproven	$\frac{32}{32-3\pi^2} = 15 - \cfrac{45}{33-\cfrac{240}{57-\cfrac{735}{87-\cfrac{1728}{123-\cfrac{3465}{\ddots}}}}}$	$a_n = n(3n+15)+15,\ b_n = -n(n+2)(n+4)(2n+1)$	0.311
new and unproven	$\frac{16+3\pi^2}{16-\pi^2} = 7 + \cfrac{8}{19-\cfrac{27}{37-\cfrac{192}{61-\cfrac{625}{91-\cfrac{1512}{\ddots}}}}}$	$a_n = n(3n+9)+7,\ b_n = -(n+1)^3(2n-3)$	0.31948
new and unproven	$\frac{18}{-8+\pi^2} = 10 - \cfrac{10}{29-\cfrac{112}{58-\cfrac{486}{97-\cfrac{1408}{146-\cfrac{3250}{\ddots}}}}}$	$a_n = n(5n+14)+10,\ b_n = -2n^3(2n+3)$	0.60629

References

[1] Shirali Kadyrov and Alibek Orynbassar. On the solutions of second order difference equations with variable coefficients. *arXiv preprint arXiv:2103.03554*, 2021.