Im Debattierclub n°111[2]

The infinite periodic palindromic simple continued fraction

We consider the infinite periodic palindromic continued fraction

$\rho_{123} = [0;1,2,3,2,1,2,3,2,1,2,3,2,\ldots]$. (1)

** Calculate and discuss the decimal representation of ρ_{123}.

** Find and discuss

the representation of ρ_{123} as a quadratic irrational and

the related quadratic equation

Extension

Given

infinite periodic palindromic scf

$\rho_{abc,,,pq}$

$=[0;a,b,c,\ldots,p,q,p,\ldots,c,b,a,b,c,\ldots,p,q,p,\ldots,c,b,a,b,c,\ldots p,q,p,\ldots]$

$a, b, c, \ldots, p, q \in \mathbb{N}$ (2)

Find and discuss

the representation of $\rho_{abc,,,pq}$ as a quadratic irrational and

the related quadratic equation (see [1,2,3]).

Take the next extension step from ippscf to the branched ippscf (see Unit 12 and Unit 193).

References

[1] https://en.wikipedia.org/wiki/Continued_fraction

[2] https://en.wikipedia.org/wiki/Periodic_continued_fraction

[3] https://en.wikipedia.org/wiki/Quadratic_irrational