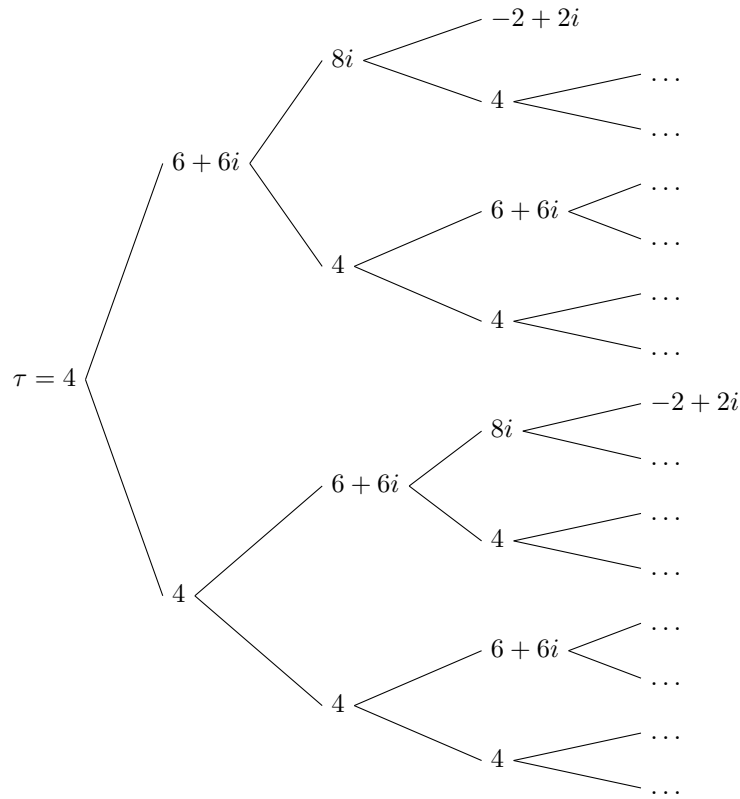


Example of a Purely Periodic Quatrenary Continued Fraction Over $\mathbb{Z}[i]$

Bryan Arnold

January 13, 2017

Let $\alpha = \sqrt[4]{2+i}$ be the principal root. And let $\tau = 1 + \alpha + \alpha^2 + \alpha^3$ (nearly $5.38912 + 1.10811i$). Then



where we denote

$$p + \frac{q}{r} = p \left\langle \begin{matrix} q \\ r \end{matrix} \right.$$

More precisely, we have $A_n/D_n \rightarrow \tau$ as $n \rightarrow \infty$, where

$$\begin{pmatrix} A_n \\ B_n \\ C_n \\ D_n \end{pmatrix} = \begin{pmatrix} 4 & 1 & 0 & 0 \\ 6+6i & 0 & 1 & 0 \\ 8i & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix} \begin{pmatrix} 4 & 1 & 0 & 0 \\ 6+6i & 0 & 1 & 0 \\ 8i & 0 & 0 & 1 \\ -2+2i & 0 & 0 & 0 \end{pmatrix}^n \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}.$$