Pentadentrite IFS Calculations

$with(LinearAlgebra)$:

$$r := \mathrm{sqrt}\left(\frac{(6 - \mathrm{sqrt}(5))}{31} \right)$$

$$\frac{1}{31}\sqrt{186 - 31\sqrt{5}} \tag{1}$$

$evalf(r)$

$$0.3484496549 \tag{2}$$

$$deg := \frac{\mathrm{Pi}}{180}$$

$$\frac{1}{180}\pi \tag{3}$$

$$A := \arcsin\left(\frac{(\mathrm{sqrt}(5) - 1)}{4} \cdot \mathrm{sqrt}\left(\frac{(25 + \mathrm{sqrt}(5))}{62} \right) \right) \cdot \left(\frac{180}{\mathrm{Pi}} \right)$$

$$\frac{180 \arcsin\left(\frac{1}{248}\left(\sqrt{5} - 1\right)\sqrt{1550 + 62\sqrt{5}} \right)}{\pi} \tag{4}$$

$evalf(A)$

$$11.81858573 \tag{5}$$

Scaling/Rotation matrix in x 0.degrees, with scaling by r

$$rot := x \rightarrow \begin{bmatrix} r \cdot \cos(x \cdot deg) & -r \cdot \sin(x \cdot deg) \\ r \cdot \sin(x \cdot deg) & r \cdot \cos(x \cdot deg) \end{bmatrix}$$

$$x \rightarrow Matrix(2, 2, \{(1, 1) = r\cos(x\,deg), (1, 2) = -r\sin(x\,deg), (2, 1) = r\sin(x\,deg), (2, 2) = r\cos(x\,deg)\}) \tag{6}$$

Scaling/Rotation matrices

$evalf(rot(A))$

$$\begin{bmatrix} 0.3410628715 & -0.07136721717 \\ 0.07136721717 & 0.3410628715 \end{bmatrix} \tag{7}$$

$evalf(rot(A + 72))$

$$\begin{bmatrix} 0.03751996626 & -0.3464237494 \\ 0.3464237494 & 0.03751996626 \end{bmatrix} \tag{8}$$

$evalf(rot(A - 144))$

$$\begin{bmatrix} -0.2339770617 & 0.2582090172 \\ -0.2582090172 & -0.2339770617 \end{bmatrix} \tag{9}$$

$evalf(rot(A - 72))$

$$\begin{bmatrix} 0.1732684802 & 0.3023163836 \\ -0.3023163836 & 0.1732684802 \end{bmatrix} \tag{10}$$

Translations

$P0 := Vector([0, 0])$

$$\begin{bmatrix} 0 \\ 0 \end{bmatrix} \tag{11}$$

$P1 := P0 + evalf(Vector([r \cdot \cos((A) \cdot deg), r \cdot \sin((A) \cdot deg)]))$

$$\begin{bmatrix} 0.341062871500000 \\ 0.0713672171700000 \end{bmatrix} \tag{12}$$

$P2 := P1 + evalf(Vector([r \cdot \cos((72 + A) \cdot deg), r \cdot \sin((72 + A) \cdot deg)]))$

$$\begin{bmatrix} 0.378582837760000 \\ 0.417790966570000 \end{bmatrix} \tag{13}$$

$P3 := P2 + evalf(Vector([r \cdot \cos((A) \cdot deg), r \cdot \sin((A) \cdot deg)]))$

$$\begin{bmatrix} 0.719645709260000 \\ 0.489158183740000 \end{bmatrix} \tag{14}$$

$P4 := P3 + evalf(Vector([-r \cdot \cos((36 + A) \cdot deg), -r \cdot \sin((36 + A) \cdot deg)]))$

$$\begin{bmatrix} 0.485668647960000 \\ 0.230949166140000 \end{bmatrix} \tag{15}$$

$P5 := P4 + evalf(Vector([r \cdot \cos((72 - A) \cdot deg), -r \cdot \sin((72 - A) \cdot deg)]))$

$$\begin{bmatrix} 0.658937128160000 \\ -0.0713672174600000 \end{bmatrix} \tag{16}$$