Pentigree 2nd Form IFS Calculations

with(*LinearAlgebra*) :

$r := \dfrac{3 - \text{sqrt}(5)}{2}$

$$\frac{3}{2} - \frac{1}{2}\sqrt{5} \tag{1}$$

evalf(*r*)

$$0.381966012 \tag{2}$$

$deg := \dfrac{\text{Pi}}{180}$

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

Scaling/Rotation matrix

$M := Matrix\left(\begin{bmatrix} r \cdot \cos(36 \cdot deg) & -r \cdot \sin(36 \cdot deg) \\ r \cdot \sin(36 \cdot deg) & r \cdot \cos(36 \cdot deg) \end{bmatrix}\right)$

$$\begin{bmatrix} \left(\dfrac{3}{2} - \dfrac{1}{2}\sqrt{5}\right)\cos\left(\dfrac{1}{5}\pi\right) & -\left(\dfrac{3}{2} - \dfrac{1}{2}\sqrt{5}\right)\sin\left(\dfrac{1}{5}\pi\right) \\ \left(\dfrac{3}{2} - \dfrac{1}{2}\sqrt{5}\right)\sin\left(\dfrac{1}{5}\pi\right) & \left(\dfrac{3}{2} - \dfrac{1}{2}\sqrt{5}\right)\cos\left(\dfrac{1}{5}\pi\right) \end{bmatrix} \tag{4}$$

evalf(*M*)

$$\begin{bmatrix} 0.3090169950 & -0.2245139888 \\ 0.2245139888 & 0.3090169950 \end{bmatrix} \tag{5}$$

$V1 := Vector([\cos(18 \cdot deg), \sin(18 \cdot deg)])$

$$\begin{bmatrix} \cos\left(\dfrac{1}{10}\pi\right) \\ \sin\left(\dfrac{1}{10}\pi\right) \end{bmatrix} \tag{6}$$

$T1 := evalf(V1 - Multiply(M, V1))$

$$\begin{bmatrix} 0.7265425276 \\ -6.1\ 10^{-10} \end{bmatrix} \tag{7}$$

$V2 := Vector([\cos(90 \cdot deg), \sin(90 \cdot deg)])$

$$\begin{bmatrix} 0 \\ 1 \end{bmatrix} \tag{8}$$

$T2 := evalf(V2 - Multiply(M, V2))$

$$\begin{bmatrix} 0.2245139888 \\ 0.6909830050 \end{bmatrix}$$

(9)

$V3 := Vector([\cos(162 \cdot deg), \sin(162 \cdot deg)])$

$$\begin{bmatrix} -\cos\left(\dfrac{1}{10}\,\pi\right) \\ \sin\left(\dfrac{1}{10}\,\pi\right) \end{bmatrix}$$

(10)

$T3 := evalf(V3 - Multiply(M, V3))$

$$\begin{bmatrix} -0.5877852516 \\ 0.4270509834 \end{bmatrix}$$

(11)

$V4 := Vector([\cos(234 \cdot deg), \sin(234 \cdot deg)])$

$$\begin{bmatrix} -\cos\left(\dfrac{3}{10}\,\pi\right) \\ -\sin\left(\dfrac{3}{10}\,\pi\right) \end{bmatrix}$$

(12)

$T4 := evalf(V4 - Multiply(M, V4))$

$$\begin{bmatrix} -0.5877852523 \\ -0.4270509824 \end{bmatrix}$$

(13)

$V5 := Vector([\cos(306 \cdot deg), \sin(306 \cdot deg)])$

$$\begin{bmatrix} \cos\left(\dfrac{3}{10}\,\pi\right) \\ -\sin\left(\dfrac{3}{10}\,\pi\right) \end{bmatrix}$$

(14)

$T5 := evalf(V5 - Multiply(M, V5))$

$$\begin{bmatrix} 0.2245139875 \\ -0.6909830054 \end{bmatrix}$$

(15)