

Pentigree 2nd Form IFS Calculations

with(LinearAlgebra) :

$$r := \frac{3 - \sqrt{5}}{2} \qquad \frac{3}{2} - \frac{1}{2} \sqrt{5} \qquad (1)$$

$$\text{evalf}(r) \qquad 0.381966012 \qquad (2)$$

$$\text{deg} := \frac{\text{Pi}}{180} \qquad \frac{1}{180} \pi \qquad (3)$$

Scaling/Rotation Matrix

$$M := \begin{bmatrix} r \cdot \cos(36 \cdot \text{deg}) & -r \cdot \sin(36 \cdot \text{deg}) \\ r \cdot \sin(36 \cdot \text{deg}) & r \cdot \cos(36 \cdot \text{deg}) \end{bmatrix} \qquad \begin{bmatrix} \left(\frac{3}{2} - \frac{1}{2} \sqrt{5}\right) \cos\left(\frac{1}{5} \pi\right) & -\left(\frac{3}{2} - \frac{1}{2} \sqrt{5}\right) \sin\left(\frac{1}{5} \pi\right) \\ \left(\frac{3}{2} - \frac{1}{2} \sqrt{5}\right) \sin\left(\frac{1}{5} \pi\right) & \left(\frac{3}{2} - \frac{1}{2} \sqrt{5}\right) \cos\left(\frac{1}{5} \pi\right) \end{bmatrix} \qquad (4)$$

$$\text{evalf}(\text{Matrix}(M)) \qquad \begin{bmatrix} 0.3090169950 & -0.2245139888 \\ 0.2245139888 & 0.3090169950 \end{bmatrix} \qquad (5)$$

Translation Vectors

$$V1 := \text{Vector}([\cos(18 \cdot \text{deg}), \sin(18 \cdot \text{deg})]) \qquad \begin{bmatrix} \cos\left(\frac{1}{10} \pi\right) \\ \sin\left(\frac{1}{10} \pi\right) \end{bmatrix} \qquad (6)$$

$$T1 := \text{evalf}(V1 - \text{Multiply}(M, V1)) \qquad \begin{bmatrix} 0.7265425276 \\ -6.1 \cdot 10^{-10} \end{bmatrix} \qquad (7)$$

$$V2 := \text{Vector}([\cos(90 \cdot \text{deg}), \sin(90 \cdot \text{deg})]) \qquad \begin{bmatrix} 0 \\ 1 \end{bmatrix} \qquad (8)$$

$$T2 := \text{evalf}(V2 - \text{Multiply}(M, V2)) \quad \begin{bmatrix} 0.2245139888 \\ 0.6909830050 \end{bmatrix} \quad (9)$$

$$V3 := \text{Vector}([\cos(162 \cdot \text{deg}), \sin(162 \cdot \text{deg})]) \quad \begin{bmatrix} -\cos\left(\frac{1}{10} \pi\right) \\ \sin\left(\frac{1}{10} \pi\right) \end{bmatrix} \quad (10)$$

$$T3 := \text{evalf}(V3 - \text{Multiply}(M, V3)) \quad \begin{bmatrix} -0.5877852516 \\ 0.4270509834 \end{bmatrix} \quad (11)$$

$$V4 := \text{Vector}([\cos(234 \cdot \text{deg}), \sin(234 \cdot \text{deg})]) \quad \begin{bmatrix} -\cos\left(\frac{3}{10} \pi\right) \\ -\sin\left(\frac{3}{10} \pi\right) \end{bmatrix} \quad (12)$$

$$T4 := \text{evalf}(V4 - \text{Multiply}(M, V4)) \quad \begin{bmatrix} -0.5877852523 \\ -0.4270509824 \end{bmatrix} \quad (13)$$

$$V5 := \text{Vector}([\cos(306 \cdot \text{deg}), \sin(306 \cdot \text{deg})]) \quad \begin{bmatrix} \cos\left(\frac{3}{10} \pi\right) \\ -\sin\left(\frac{3}{10} \pi\right) \end{bmatrix} \quad (14)$$

$$T5 := \text{evalf}(V5 - \text{Multiply}(M, V5)) \quad \begin{bmatrix} 0.2245139875 \\ -0.6909830054 \end{bmatrix} \quad (15)$$