

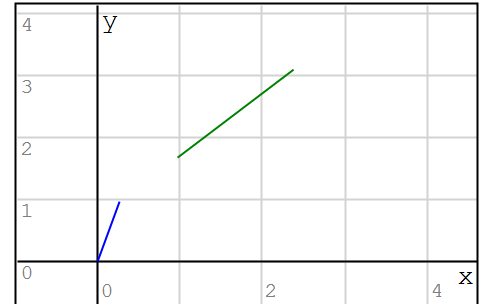
Examples

Turtle graphics. Instructions could be:

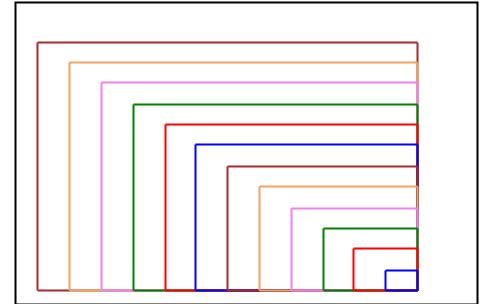
`to := time(0)`

U n - Up the pen
 D n - Downs the pen with color n
 F n - Move forward n steps
 B n - Move backwards n steps
 R n - Turn right n radians
 L n - Turn left n radians
 H n - Set the turtle head to n radians

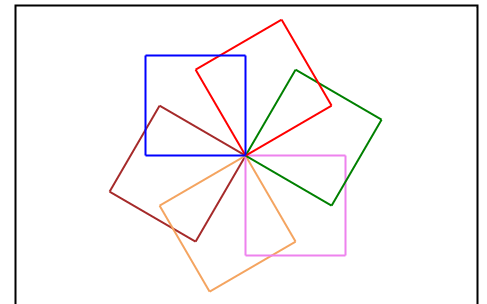
$$P_1 := \text{turtle} \left(\left[\begin{array}{ccccccc} \text{"R"} & \text{"F"} & \text{"U"} & \text{"R"} & \text{"F"} & \text{"D"} & \text{"F"} \\ 15^\circ & 1 & 0 & 30^\circ & 1 & 3 & 2 \end{array} \right]^T \right)$$



$$P_2 := \left\{ \begin{array}{l} M := [\text{"L"} 90^\circ] \\ \text{for } a \in [1..12] \\ \quad M := \text{stack}(M, \text{square}(a), [\text{"D"} a-1]) \\ \text{turtle}(M) \end{array} \right.$$



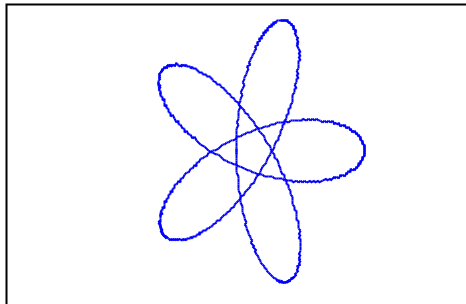
$$P_3 := \left\{ \begin{array}{l} M := [\text{"L"} 90^\circ] \\ \text{for } a \in [1..6] \\ \quad M := \text{stack}(M, \text{square}(1), [\text{"D"} a-1], [\text{"R"} 60^\circ]) \\ \text{turtle}(M) \end{array} \right.$$



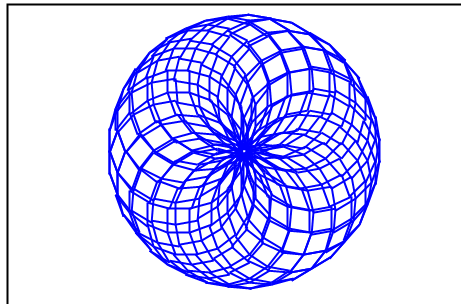
$$P_1 := \text{turtle}(\text{duopoly}(1, 2^\circ, 2, (-3)^\circ, 360))$$

$$P_2 := \text{turtle}(\text{duopoly}(1, 19^\circ, 1, (-20)^\circ, 360))$$

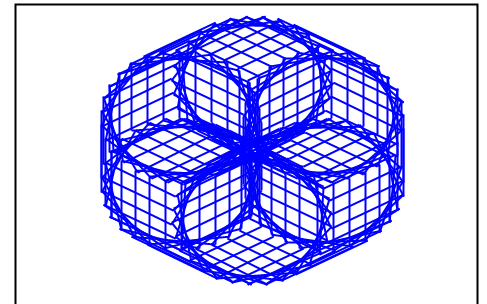
$$P_3 := \text{turtle}(\text{duopoly}(1, 62^\circ, 1, 300^\circ, 180))$$



P_1



P_2

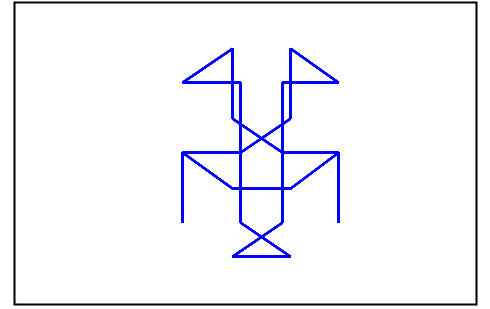
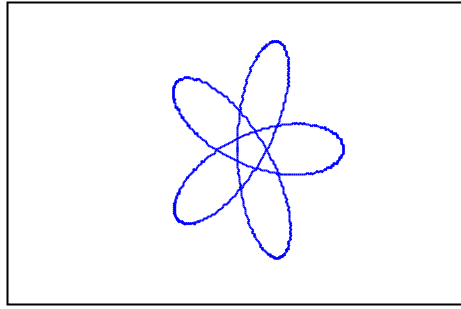
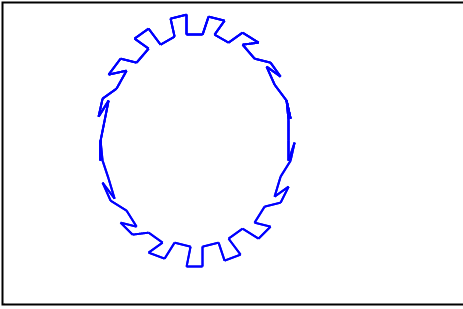


P_3

$$P_1 := \text{turtle}(\text{duopoly}(1, 10^\circ, 1, 200^\circ, 90))$$

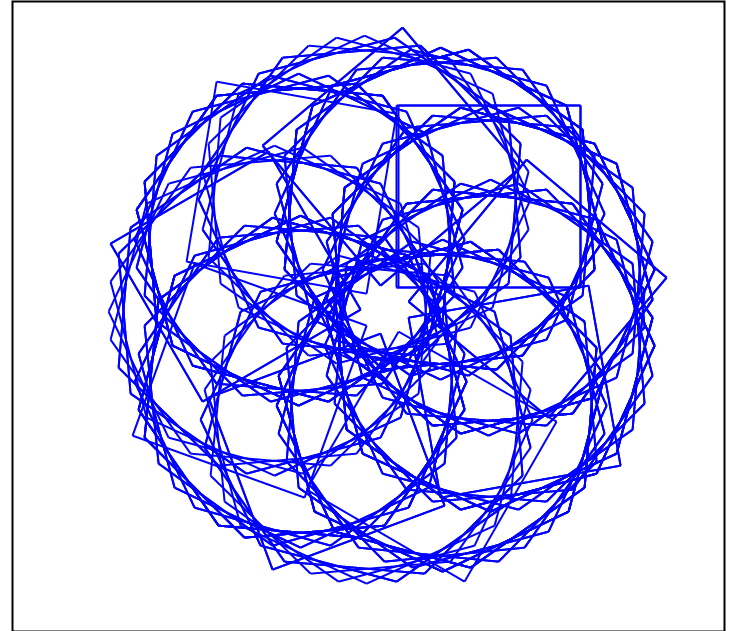
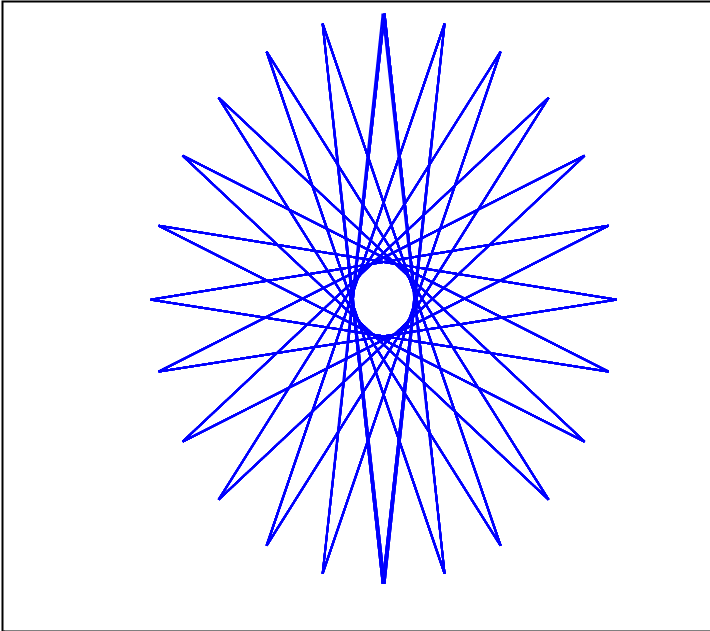
$P_2 := \text{turtle}(\text{duopoly}(1, 2^\circ, 2, (-3)^\circ, 360))$

$P_3 := \text{turtle}(\text{duopoly}(1, 90^\circ, 1, 300^\circ, 90))$



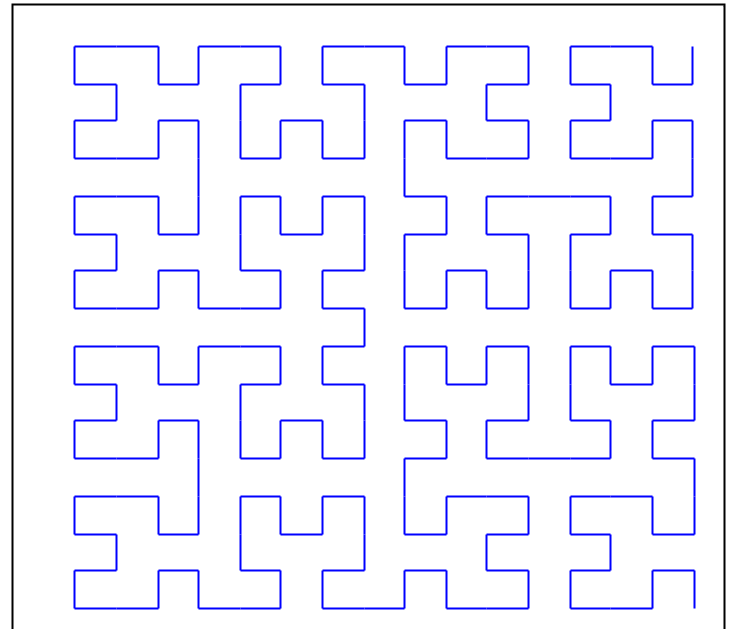
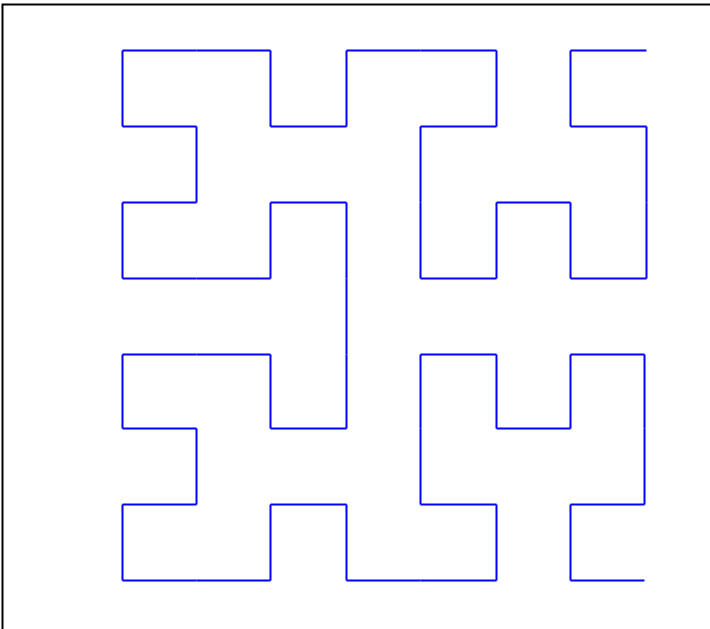
$P_1 := \text{turtle}(\text{zigzags}(165^\circ, 0))$

$P_2 := \text{turtle}(\text{sqzigzags}(50^\circ, 100^\circ, 15))$



$P_1 := \text{turtle}(\text{hilbert}(10, 3, 1))$

$P_2 := \text{turtle}(\text{hilbert}(1, 4, 1))$



Alvaro

time(0) - to = 83.872 s