

# Hilbert Curve

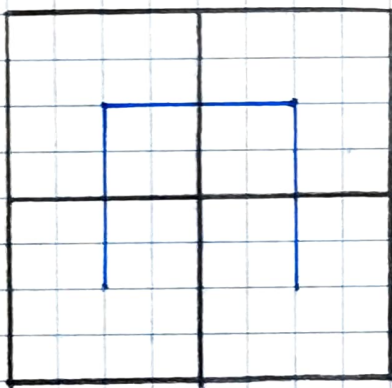
## Fractals : cups and joins

- (i) cup: a square with one open side
- (ii) join: a vector that joins two cups

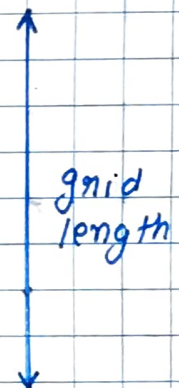
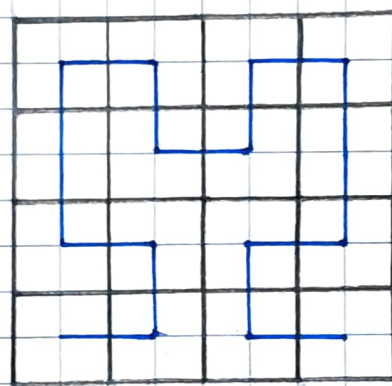
The open side of a cup can be TOP, BOTTOM, LEFT OR RIGHT  
a join has a direction UP, DOWN, LEFT OR RIGHT

- A first order hilbert curve is just a single cup, if fills a  $2 \times 2$  space
- The second order Hilbert curve replaces the cup by four smaller cup which are linked by three joins.

order = 1



order = 2

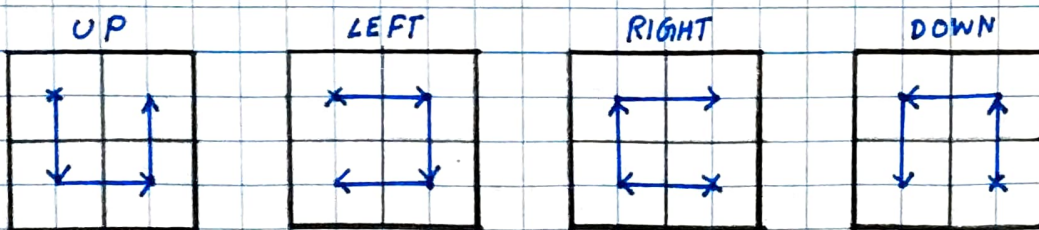


arithmetic:

for an order =  $n$   
 $\text{grid} = (2^n \times 2^n)$   
 { if for order 1 }  
 $\text{grid} = 2 \times 2$

and,  $\left[ \begin{array}{l} \text{Stroke Size (join length)} \\ = \text{grid length} / 2^n \end{array} \right]$

## A) cup drawing rules.



x - starting point.

Therefore;

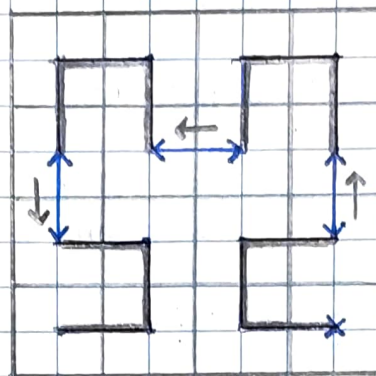
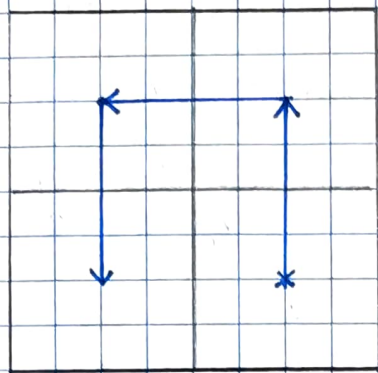
LEFT = \*  $\rightarrow$   $\downarrow$   $\leftarrow$

RIGHT = x  $\leftarrow$   $\uparrow$   $\rightarrow$

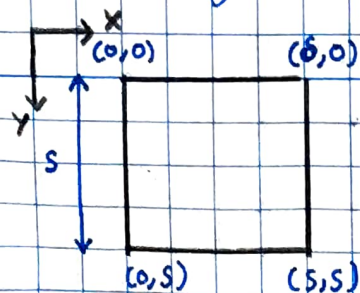
UP = x  $\downarrow$   $\rightarrow$

DOWN = x  $\uparrow$   $\leftarrow$

B) cup sub-division Rule :



c) Locating starting point x. {according to QT Creator}



Let order = n.

(i) for UP/LEFT

start x =  $0 + \frac{\text{StrokeSize}}{2}$

start y =  $0 + \frac{\text{StrokeSize}}{2}$

(ii) for DOWN/RIGHT

start x =  $S - \frac{\text{StrokeSize}}{2}$

start y =  $S - \frac{\text{StrokeSize}}{2}$