## ESTRUCTURAS ESPACIALES, FORMAS Y ARTE EN GEOMETRÍA

# DISEÑO DE ESTRUCTURAS FRACTALES

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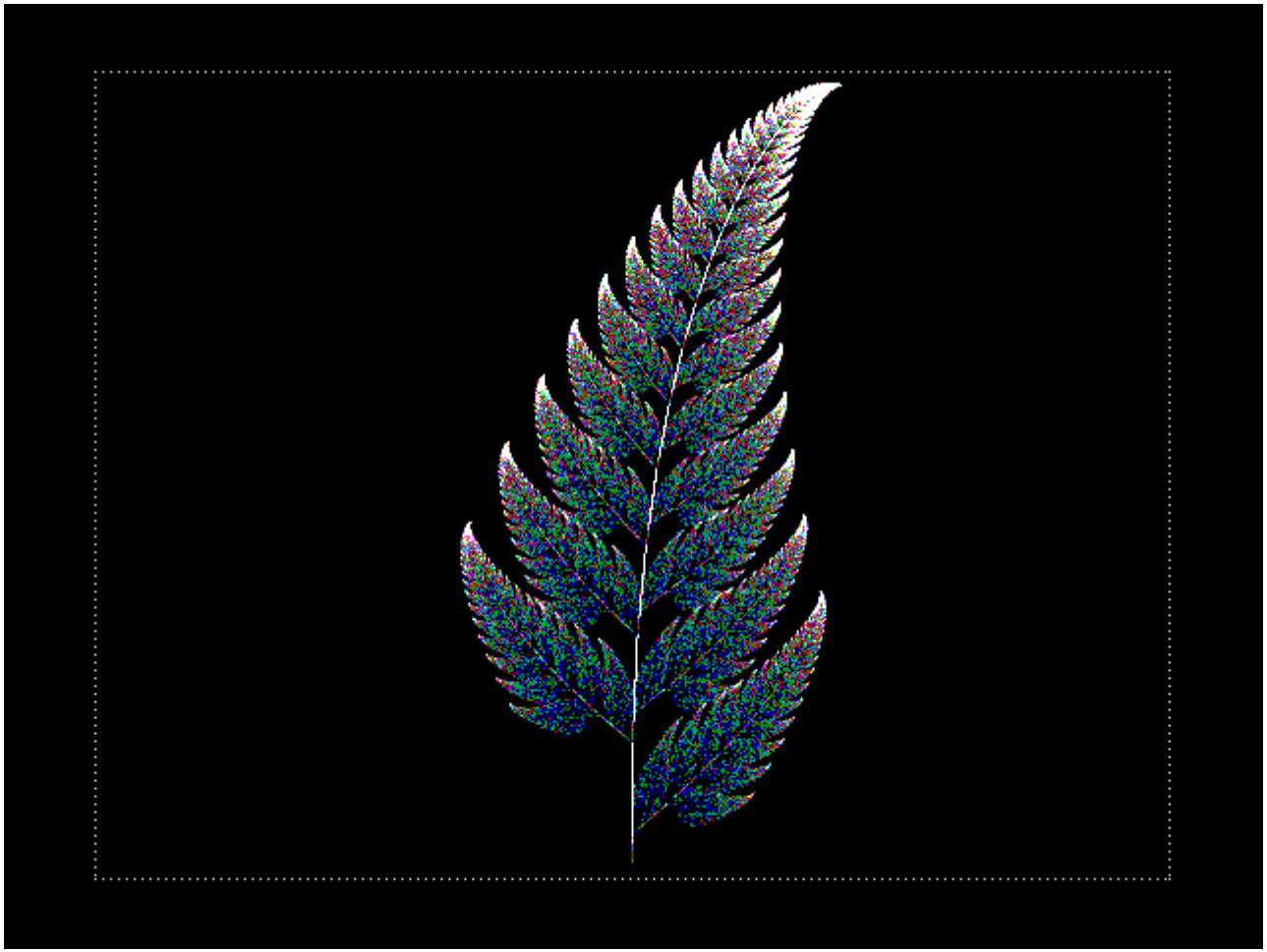
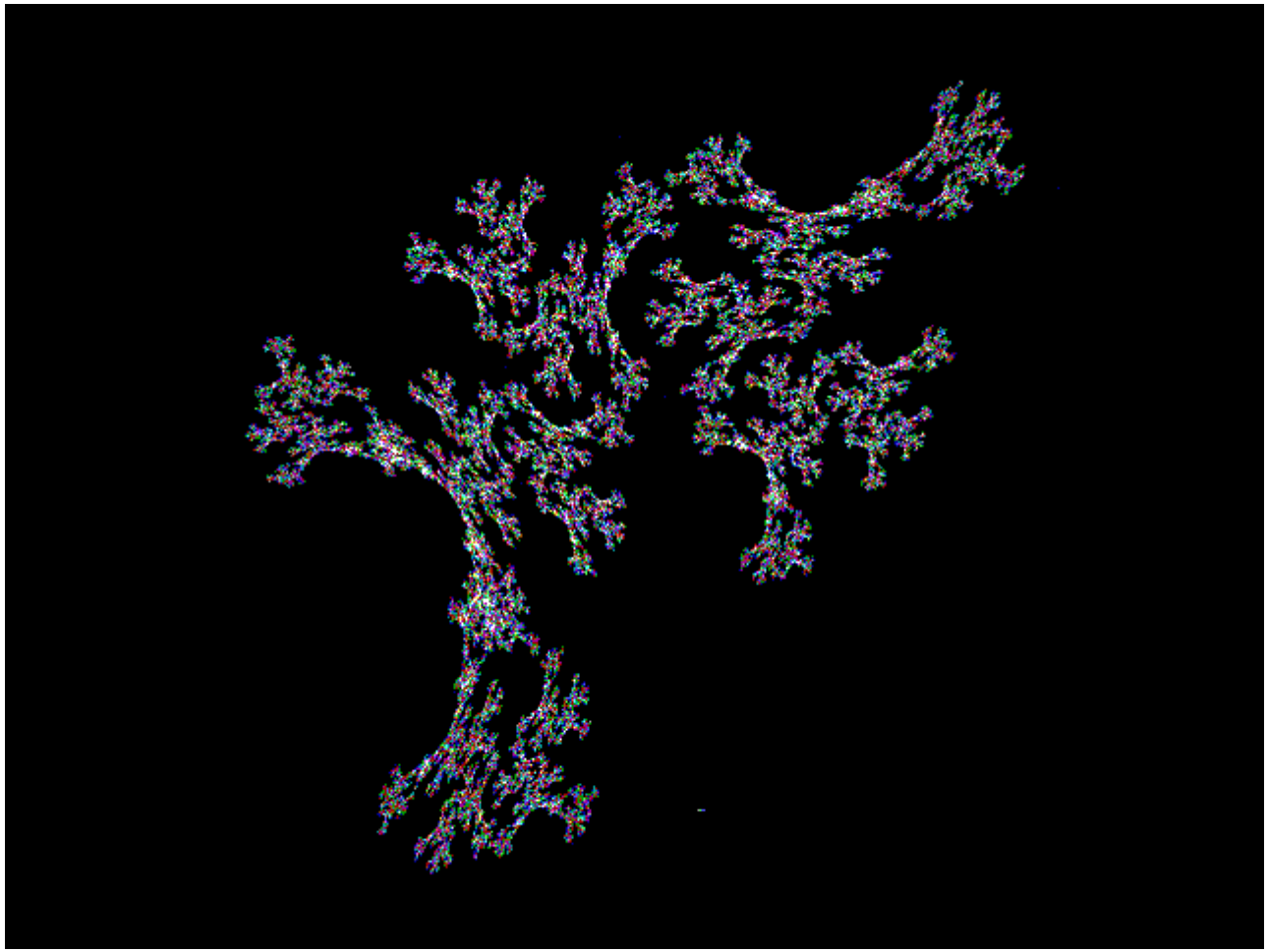
I.E.S. BENICALAP

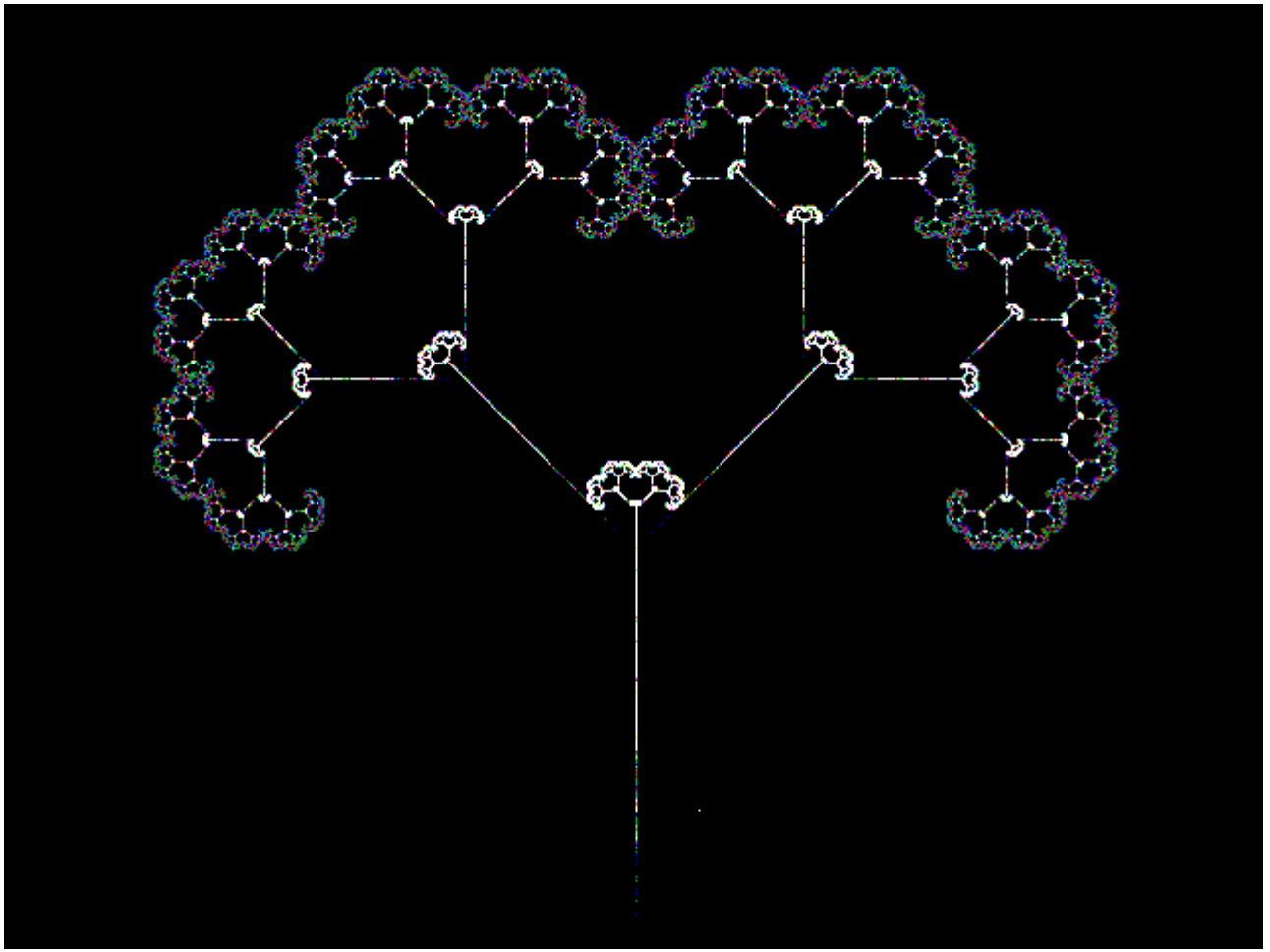
# FRACTALES EN LA NATURALEZA



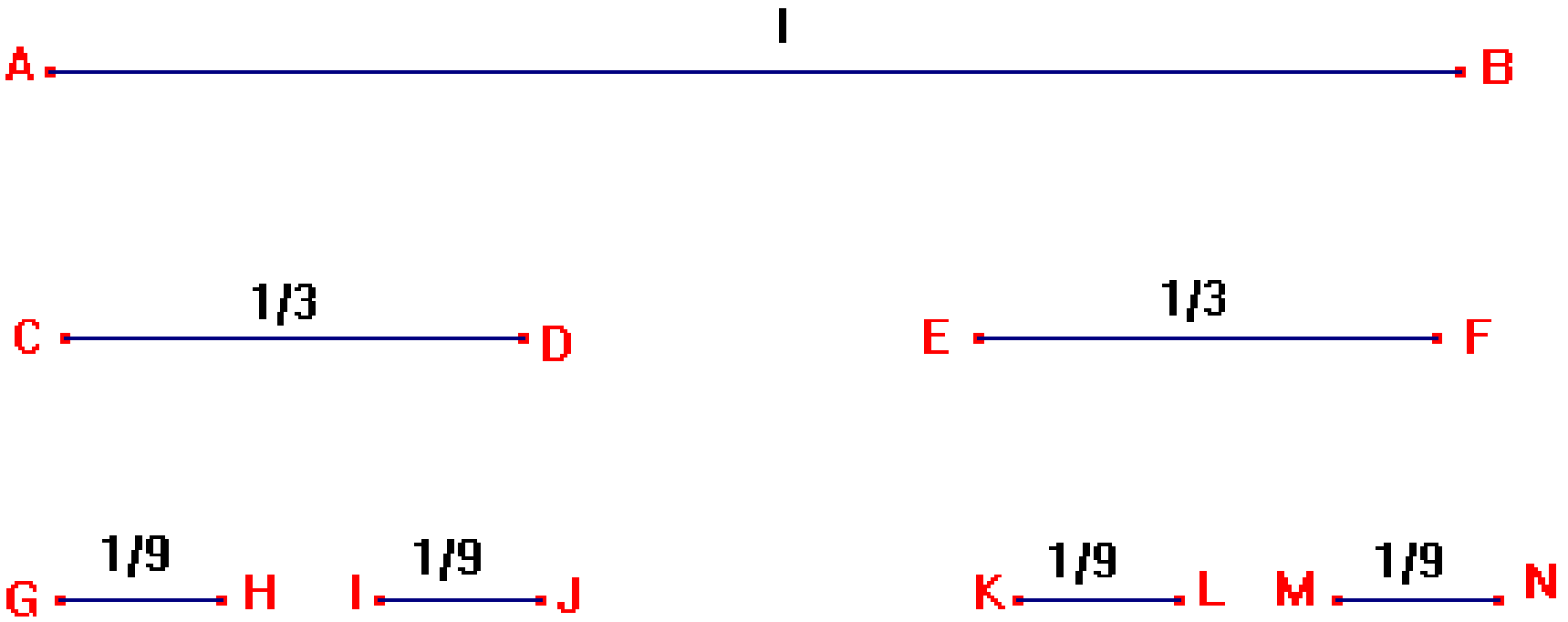
# CORAL



# ÁRBOLES



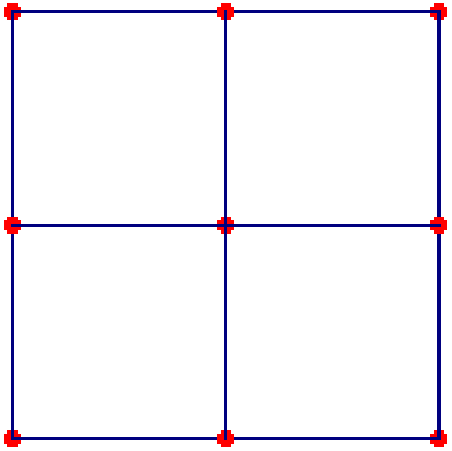
# FRACTAL DE CANTOR



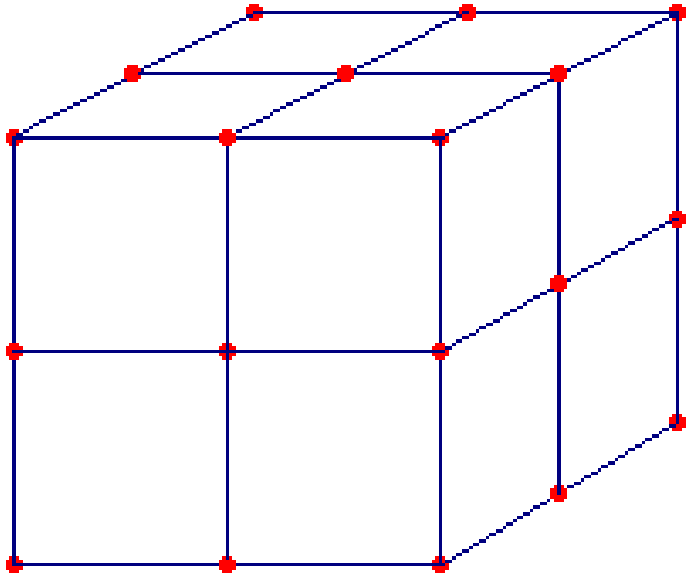

**Si repetimos el proceso infinitas veces, ¿qué figura quedará?**

# EL CONCEPTO DE DIMENSIÓN

N=4 r=1/4 D=1



N=4 r=1/2 D=2

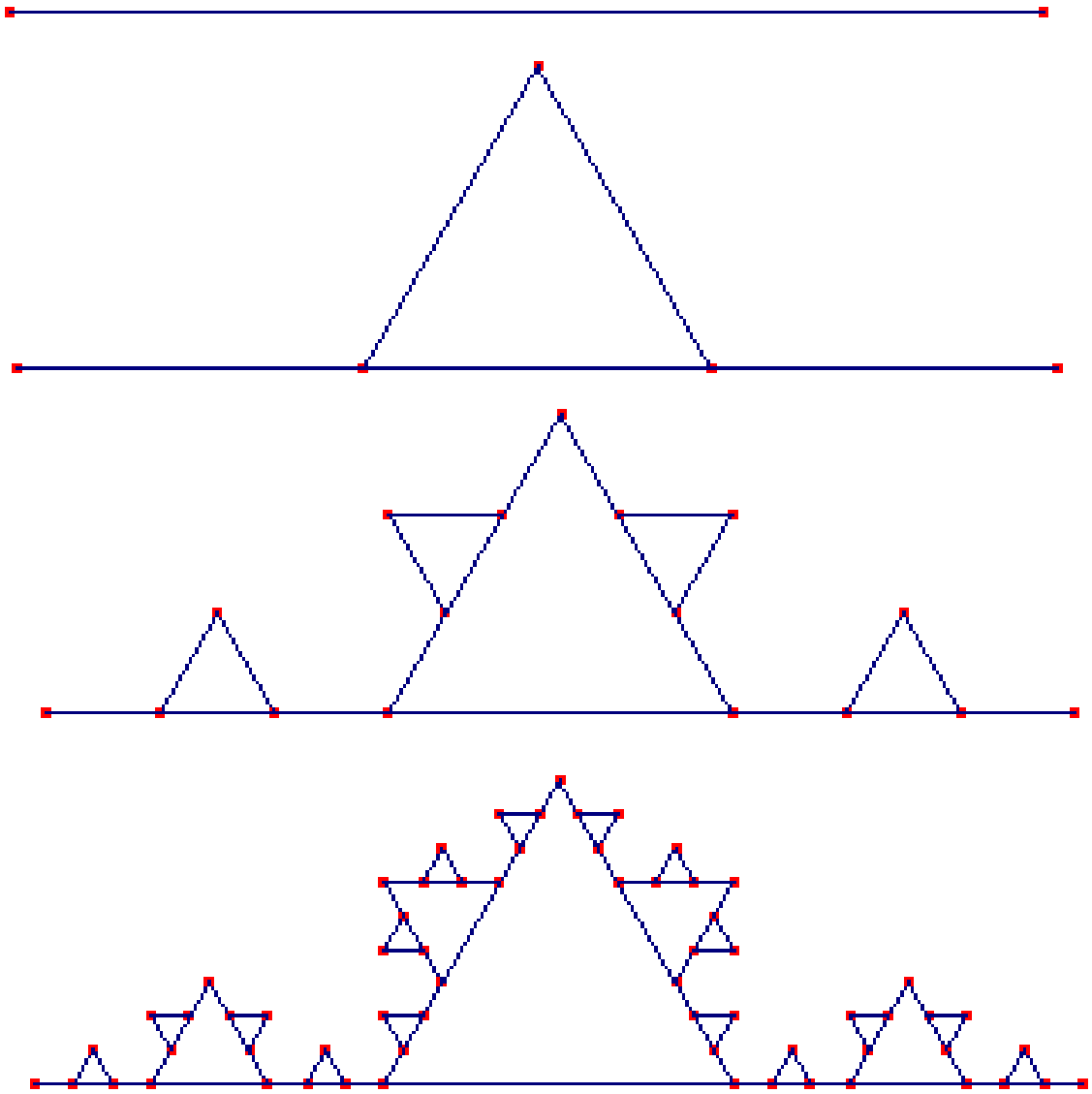


N=8 r=1/2 D=3

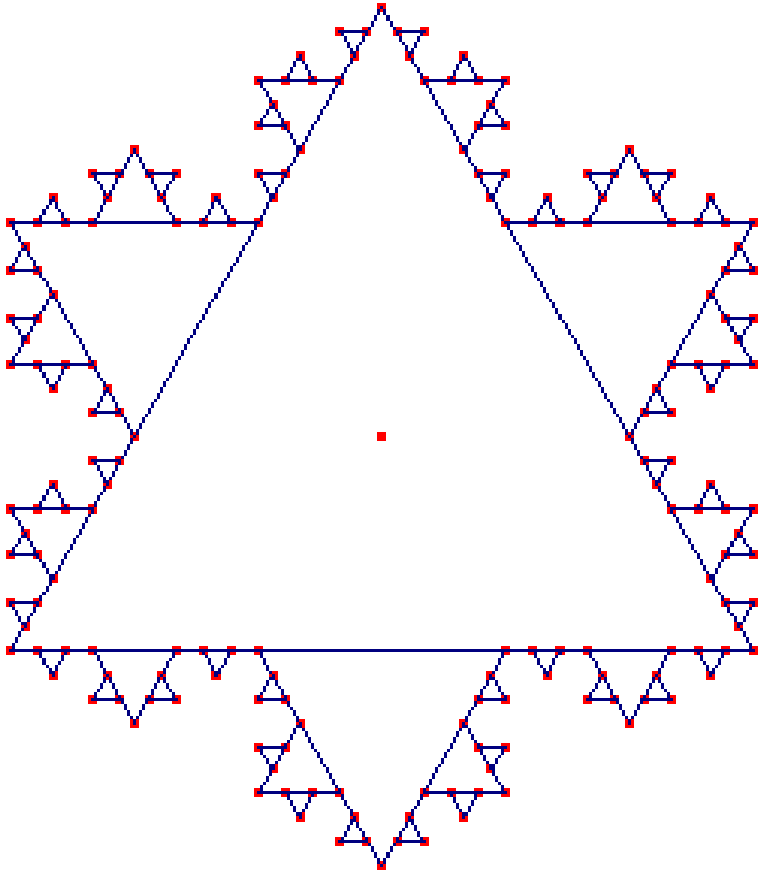
$$N \cdot r^{D} = 1$$

$$D = -\frac{\ln N}{\ln r} \Rightarrow D = \frac{\ln N}{\ln (1/r)}$$

# LA CURVA DE KOCH

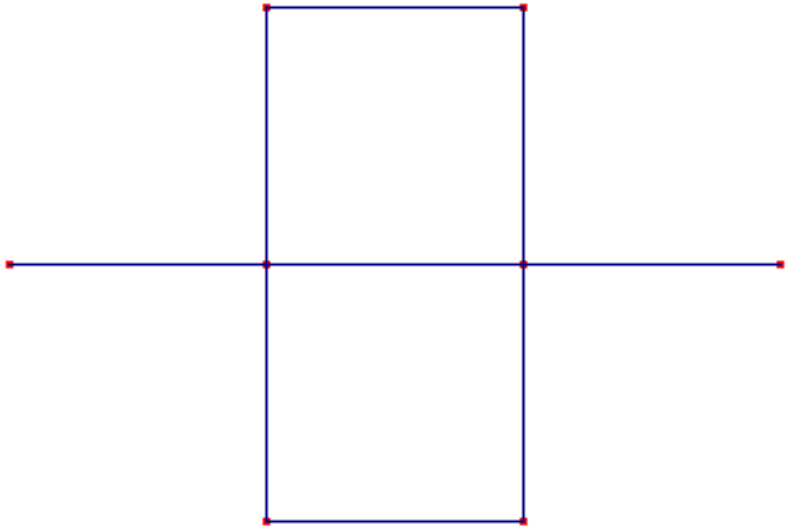


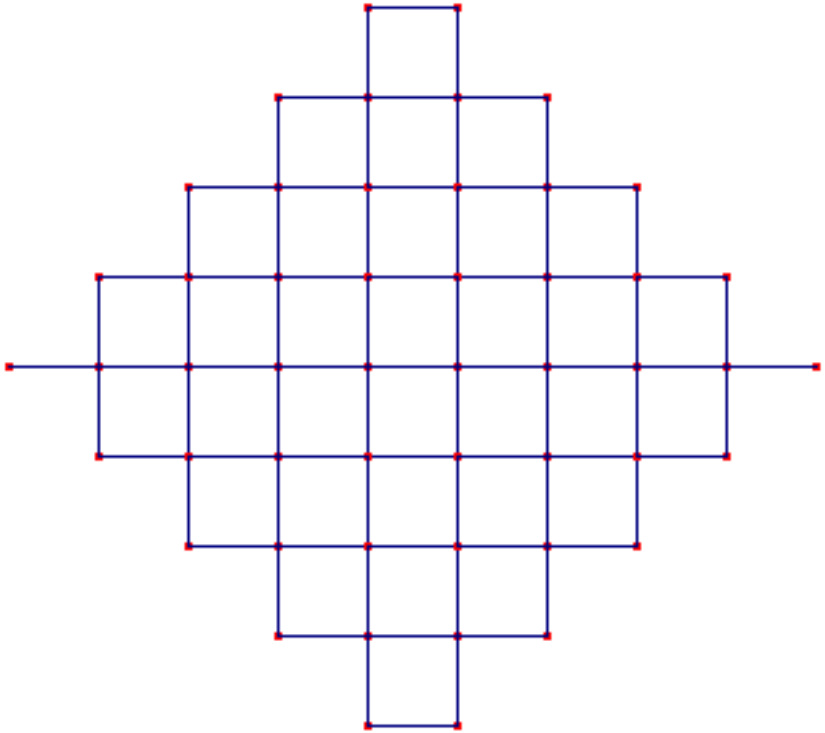
# LA ISLA DE KOCH (COPO DE NIEVE)



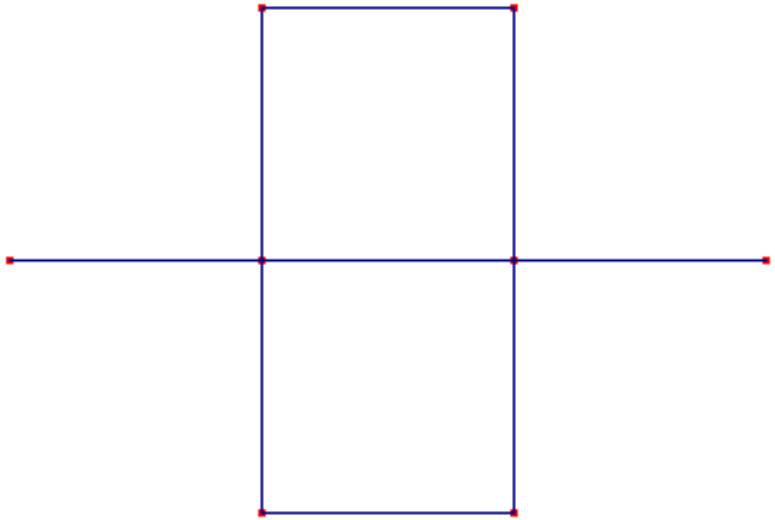
# LA CURVA DE PEANO

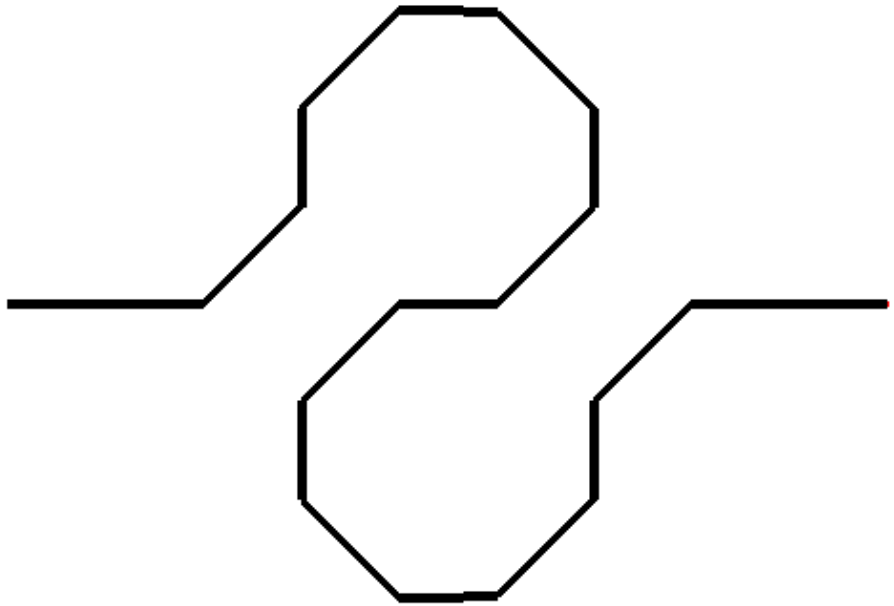




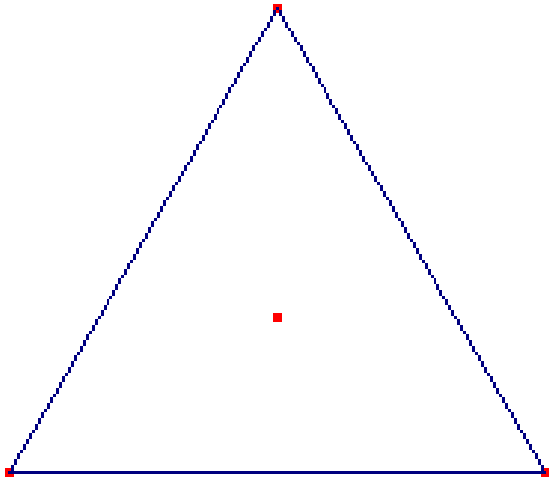


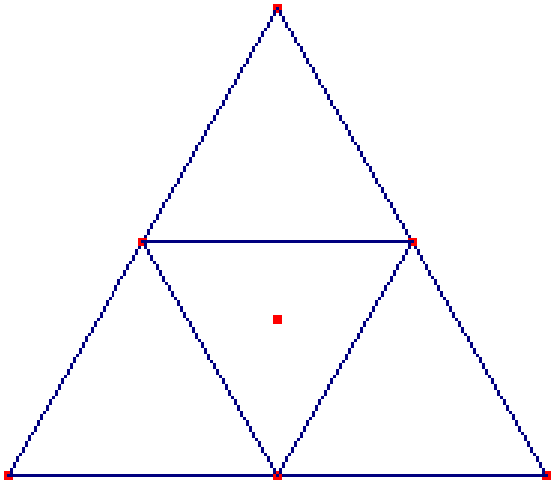
# CURVA DE PEANO SIN PUNTOS DOBLES

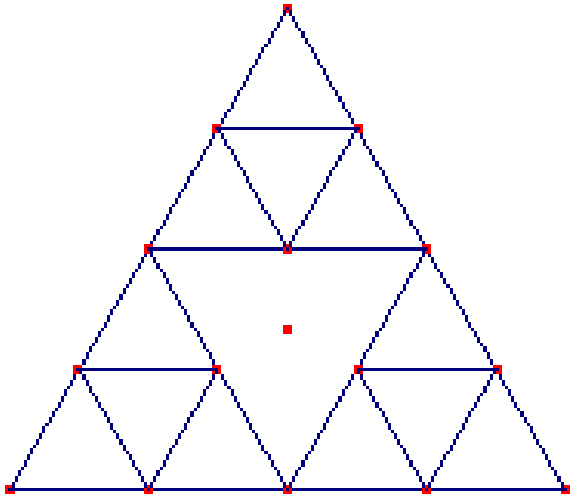


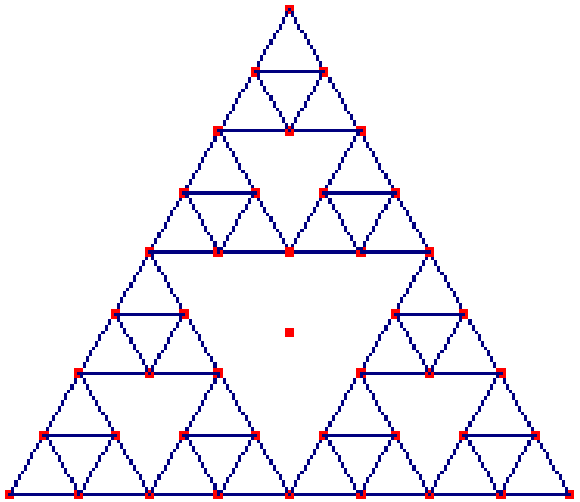


# EL TRIÁNGULO DE SIERPINSKI

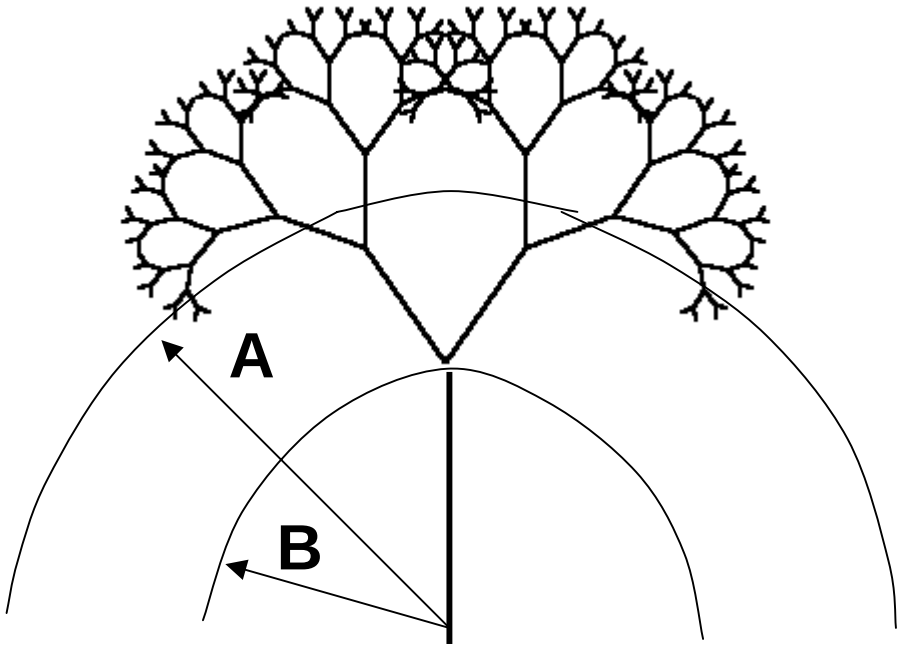






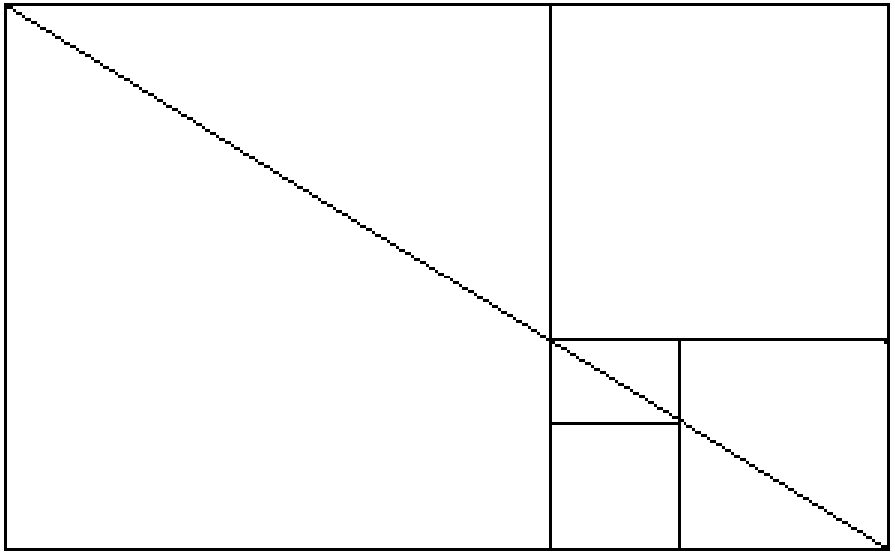


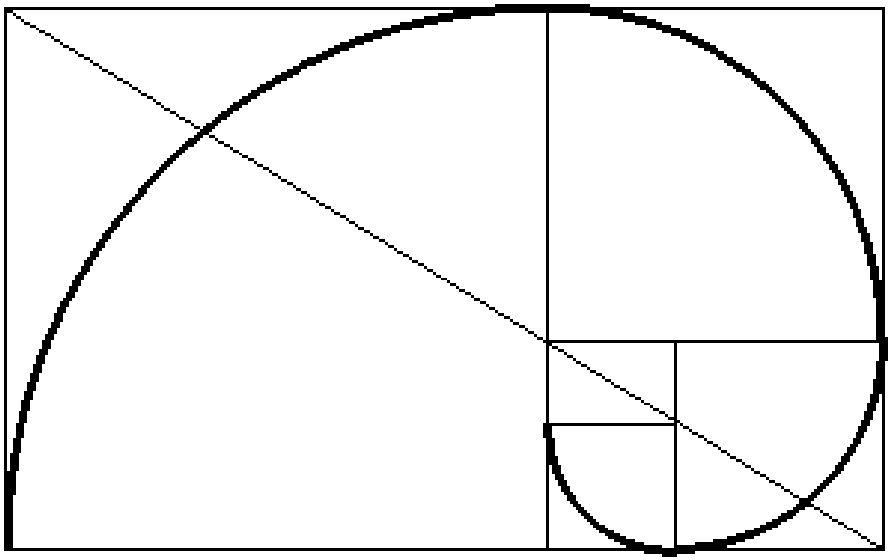
# DE LOS FRACTALES
# AL NÚMERO DE ORO




**A / B = Φ =**

# UNA ESPIRAL RECURSIVA





# ALGORITMOS RECURSIVOS

$$S = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \ldots$$

$$S = 1 + \frac{1}{2}\left(1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \ldots\right)$$

$$S = 1 + \frac{1}{2} \cdot S \qquad\qquad S = 2$$

$$S = 1 + \frac{1}{2}\left(1 + \frac{1}{2}\left(1 + \frac{1}{2}\left(1 + \frac{1}{2}(1 + \ldots)\right)\right)\ldots\right)$$

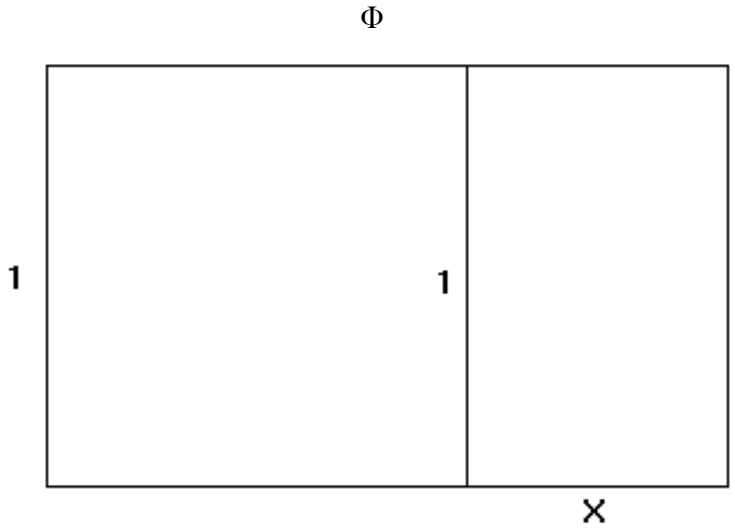
# FRACCIONES CONTINUAS

$$\sqrt{2} = 1 + \left(\sqrt{2} - 1\right) = 1 + \frac{1}{\frac{1}{\sqrt{2}-1}} = 1 + \frac{1}{\frac{\sqrt{2}+1}{1}} = 1 + \frac{1}{2 + \left(\sqrt{2} - 1\right)}$$

$$\sqrt{2} = 1 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{2 + \cfrac{1}{2 + \ldots}}}}$$

$$\sqrt{3} = 1 + \cfrac{1}{1 + \cfrac{1}{2 + \cfrac{1}{1 + \cfrac{1}{2 + \cfrac{1}{1 + \cfrac{1}{2 + \ldots}}}}}}$$

# EL NÚMERO DE ORO ES RECURSIVO




$$\frac{1}{\Phi} = \frac{X}{1} \qquad \Phi = 1 + X$$

$$\Phi = 1 + \frac{1}{\Phi}$$

$$\Phi = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \ldots}}}}}$$

# DIRECCIONES DE INTERNET INTERESANTES

**FRACTINT:**
**http://spanky.triumf.ca/www/fractint/getting.html**

**CABRI-GÉOMÈTRE II:**
**http://education.ti.com/product/software/cabri/down/download.html**

**MSWLOGO:**
**http://www.softronix.com/logo.htm**

**ÁREA FRACTAL:**
**http://www.arrakis.es/~sysifus/index.html**