Worksheet #12: Box-counting dimension

Definition: $\text{boxdim(S)} = \lim_{\epsilon \to 0} \dfrac{\ln \text{N}(\epsilon)}{\ln(1/\epsilon)}$

Using the 3 simplications from class, find (and prove if you can) the box dimension for the following sets:

(1) Curve of length L. [Hint: Is there a rigous upper bound on the number of boxes the curve can touch? Consider breaking the curve into pieces of length ϵ.]

(2) A disc. [Hint: Is there a shape with which all boxes must lie?]

(3) K_∞- the middle third Cantor set.

(4) Sierpinski Gasket

(5) $K_\infty \times K_\infty \subset [0,1]^2$