Self-Similar Objects

Objects that when you zoom in, their parts look very much like the original object.

Snowflake, mountain, tree, fern etc.

Such objects have a very natural recursive structure.

The recursive structure can be used in the process of generating images of self-similar objects.
Koch curve
Generating Koch curve - mother shape (level 1)
Generating Koch curve - level 2

At level 2, replace each basic element of level 1 (line) by the appropriately scaled image of the whole level 1.

What should be the scaling factor?
At level 3, replace each basic element of level 2 (scaled image of level 1) by the appropriately scaled image of the whole level 2.

What should be the scaling factor?
Generating Koch curve

Start at level 1 with the "mother shape".

At level 2, replace each basic element of level 1 (line) by the appropriately scaled image of the whole level 1.

For level \( n = 3, 4, 5, \ldots \)
At level \( n \), replace each basic element of level \( (n-1) \) (scaled image of level \( (n-2) \)) by the appropriately scaled image of the whole level \( (n-1) \).
Generating Koch curve - level 4
Generating Koch curve - level 5
Generating Koch curve - level 6
Generating Koch curve - level 7
Self-similarity in nature - cauliflower
Self-similarity in nature - rocks
Self-similarity in nature - Grand canyon
Self-similarity in nature - snowflake
Self-similarity in art