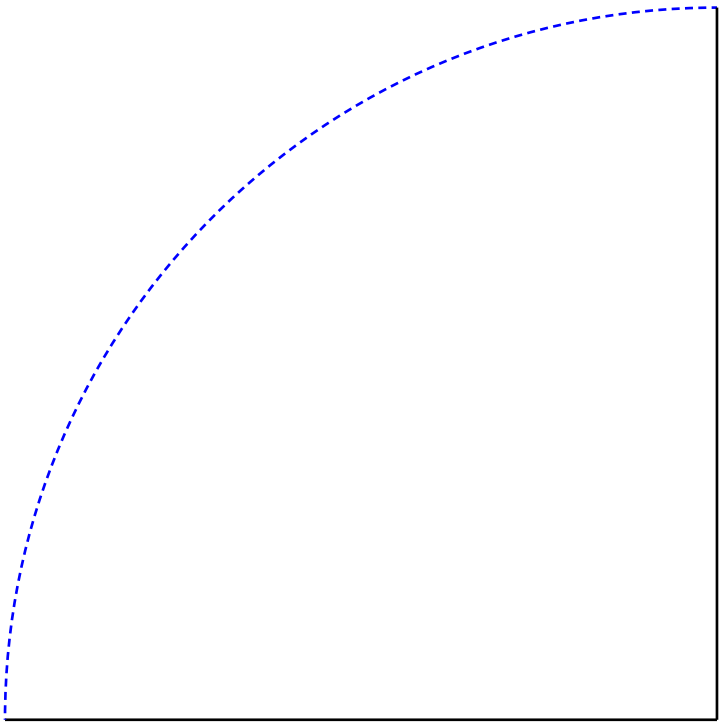
Prooving that the Golden Ratio is an irrational number using images

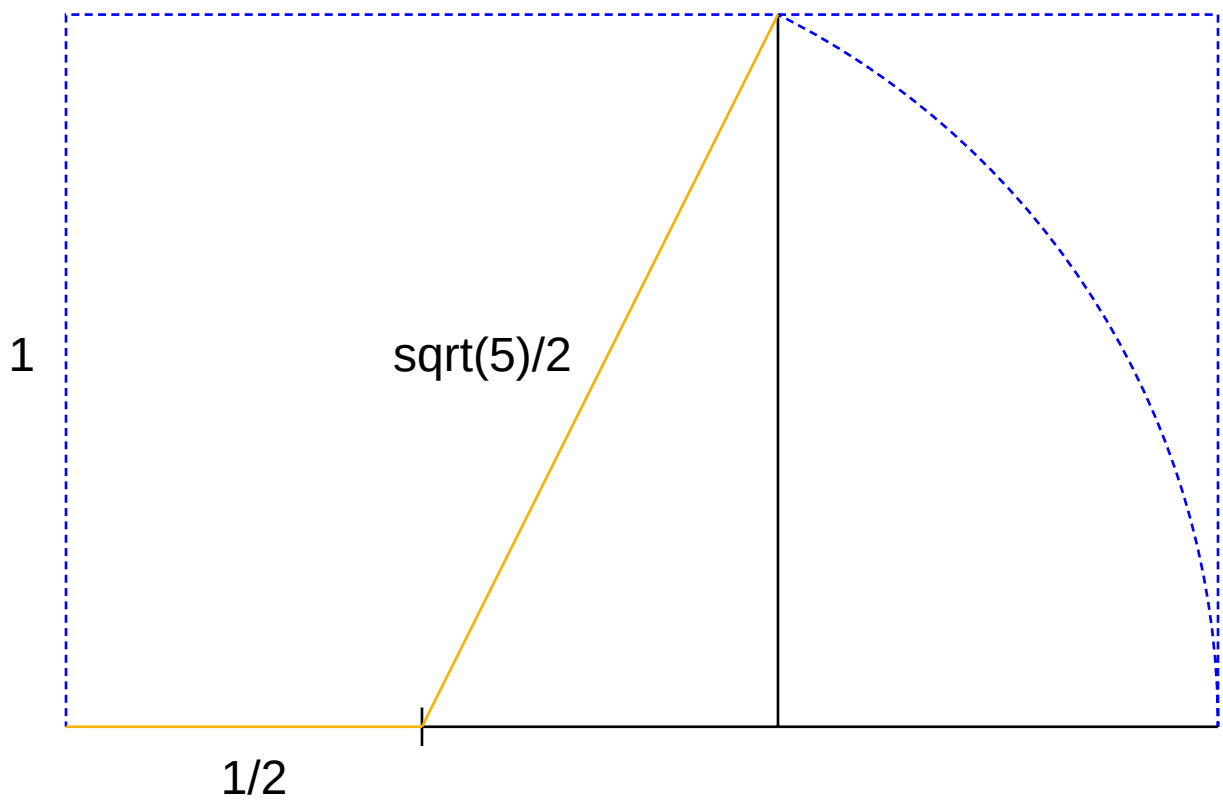
Nikola Tucakov
Math 308

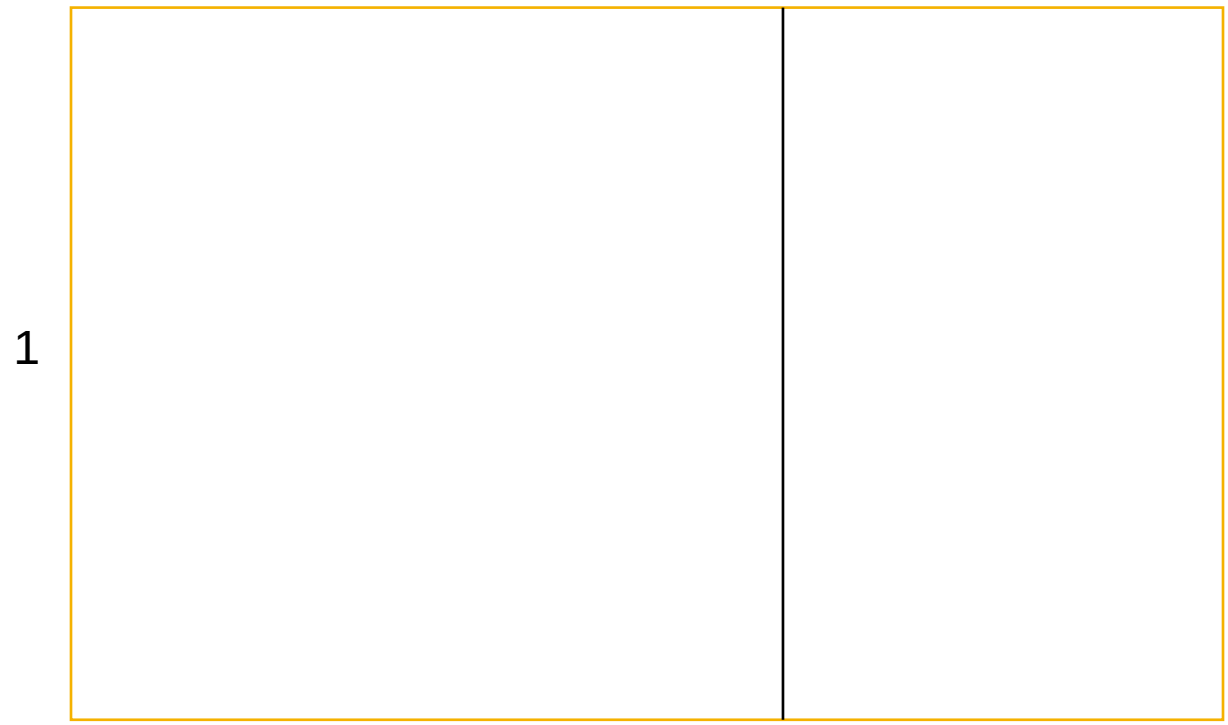
Drawing the Golden Ratio

Golden Ratio: the ratio between two values is the same as the ratio of their sum to the greater one.
$(x+1)/x = x/1$
solving this gives the following result:
Golden ratio = $1/2 + \sqrt{5}/2$
This ratio can be drawn as sides of a rectangle, called the Golden Rectangle, as follows.



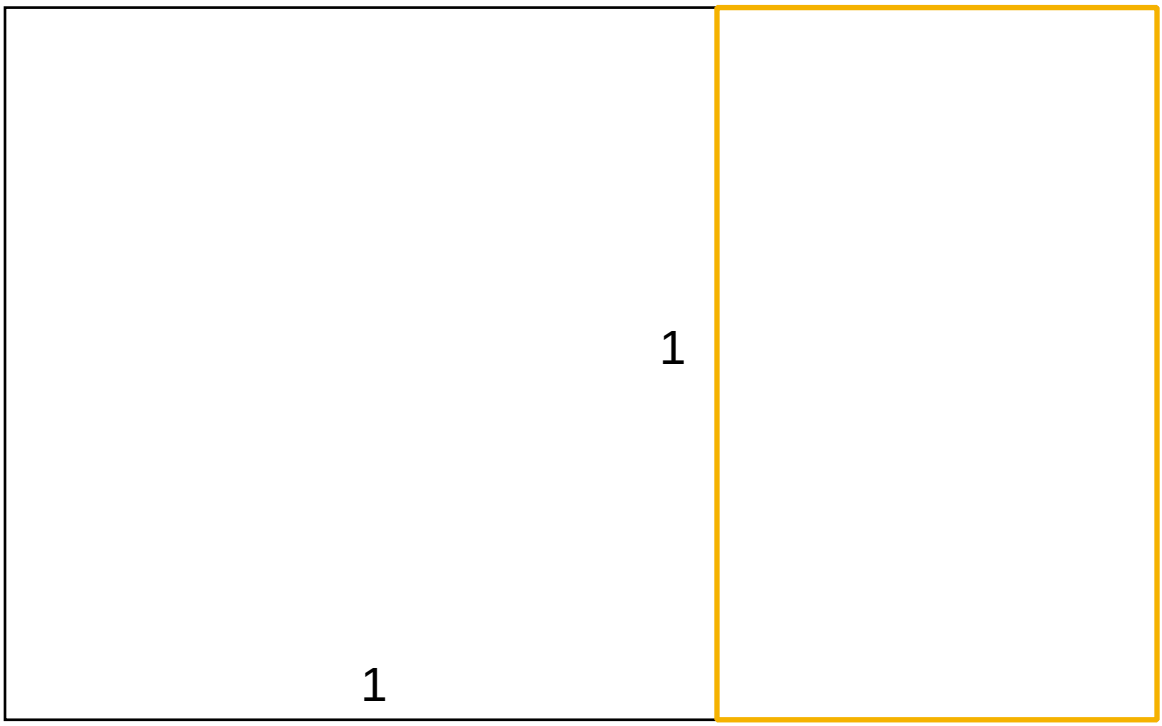
1

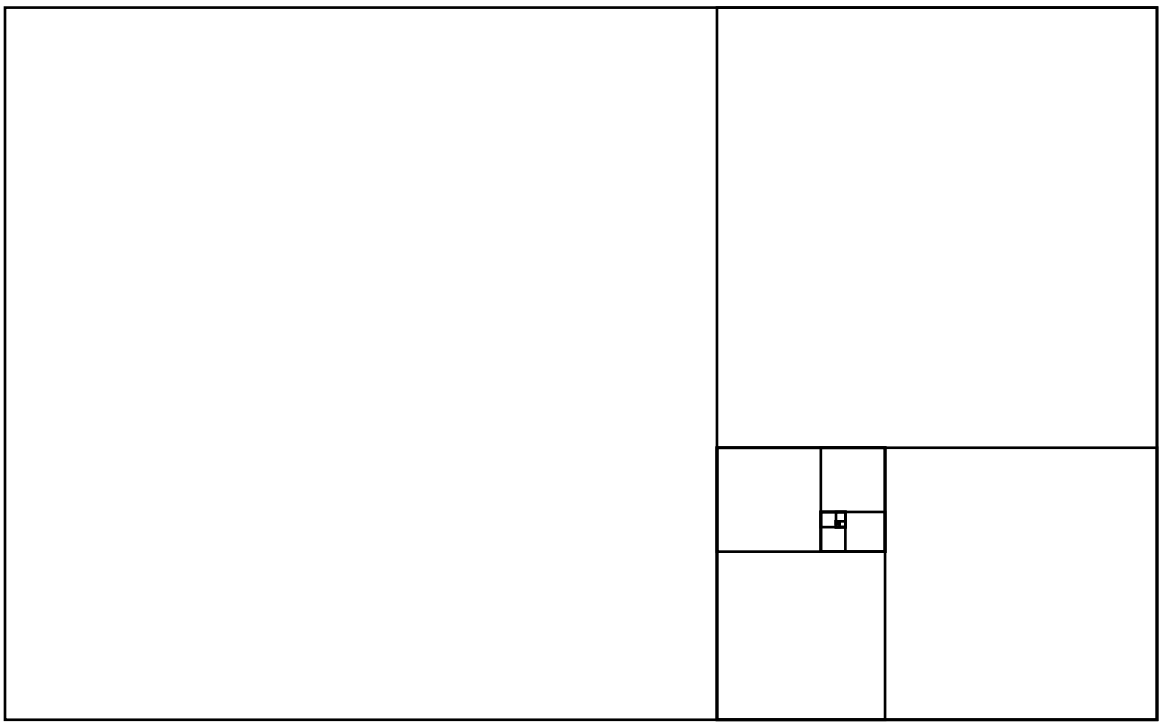

1
sqrt(5)/2
1/2


1
1/2+sqrt(5)/2

Drawing the Fractal

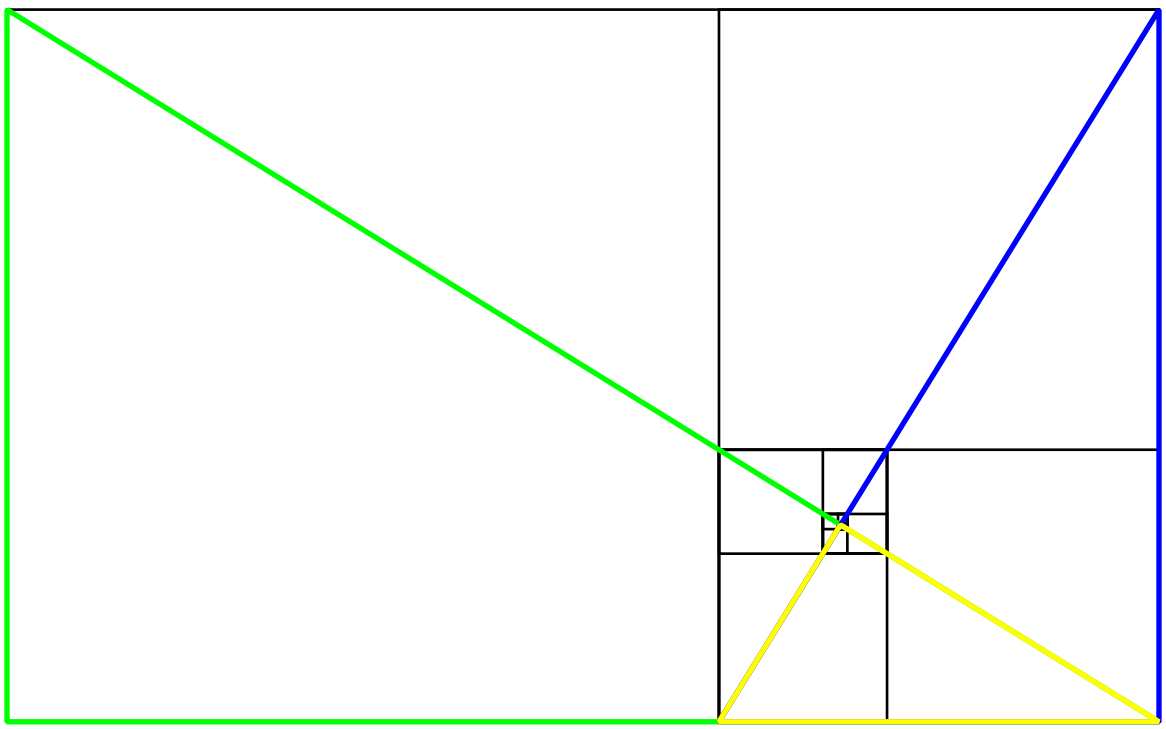
Within the golden rectangle there is another golden rectangle for the same reasoning, the sum of the sides is the golden ratio.
Within that rectangle, there is another one, and so on.
If this is continued in the same manner a fractal is obtained.

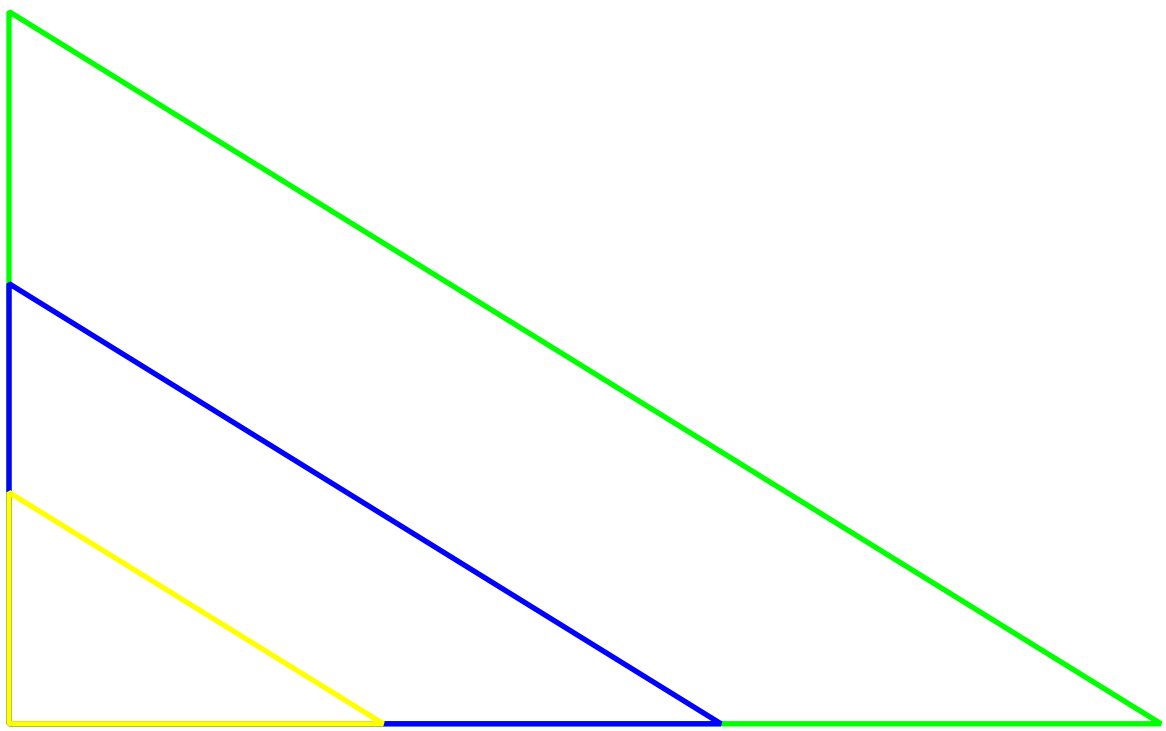

1
1
1/2+sqrt(5)/2



The Golden Diagonals

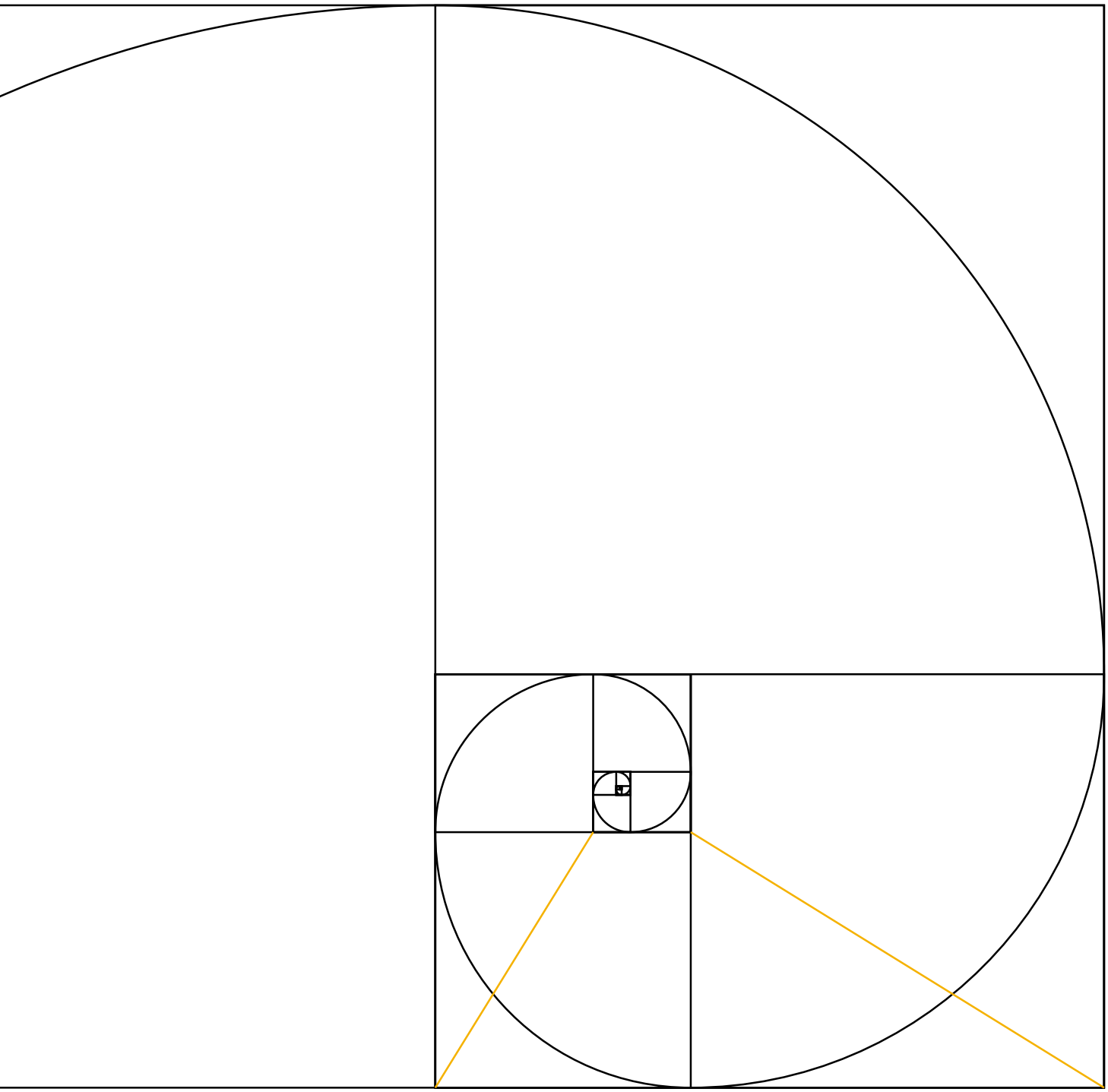
From the simmilar triangles shown, the diagonals
of the golden rectangles are in Golden Ratio;
as well is the triangle where they intersect
due to the agreement of the angles.
They form golden triangles.

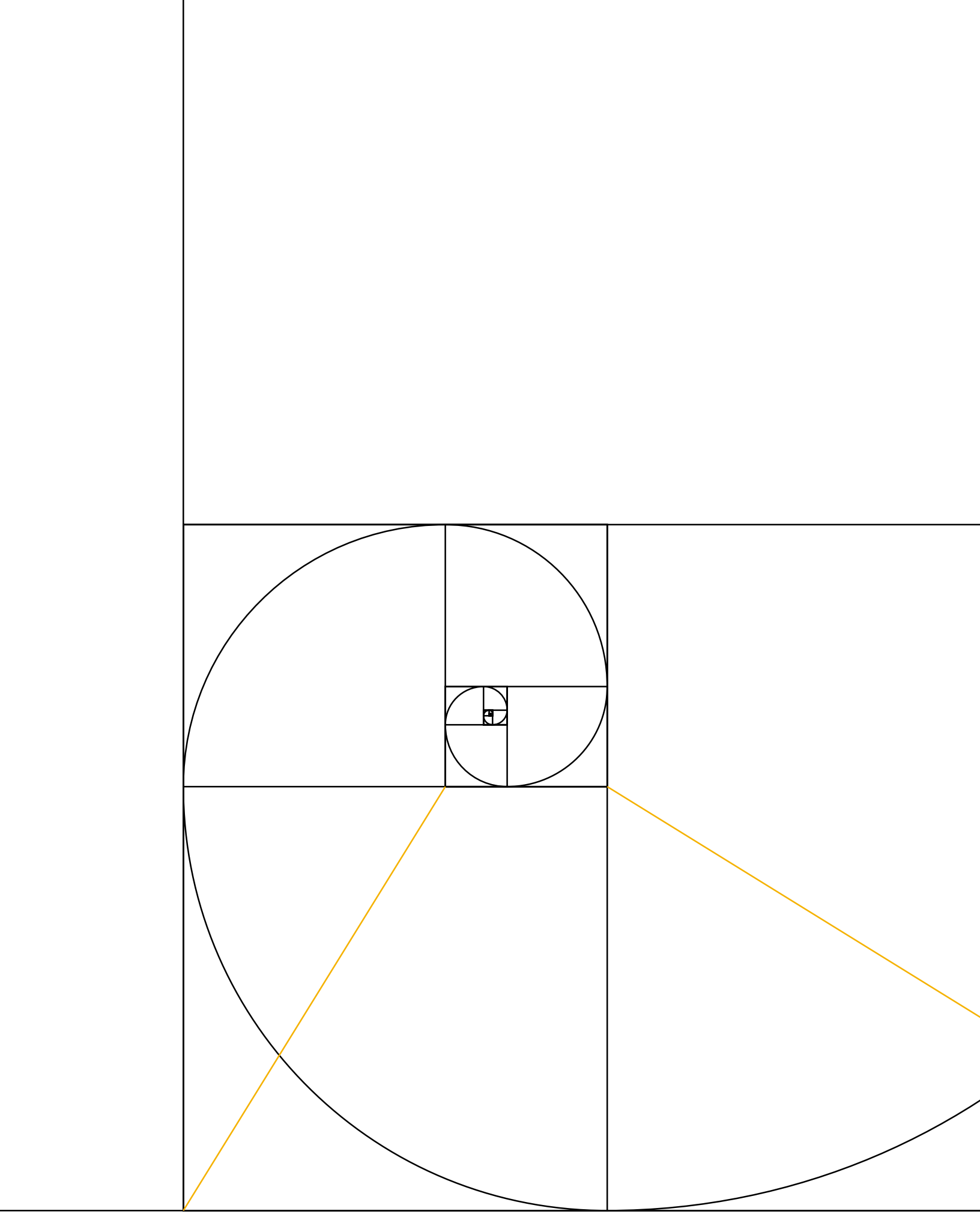


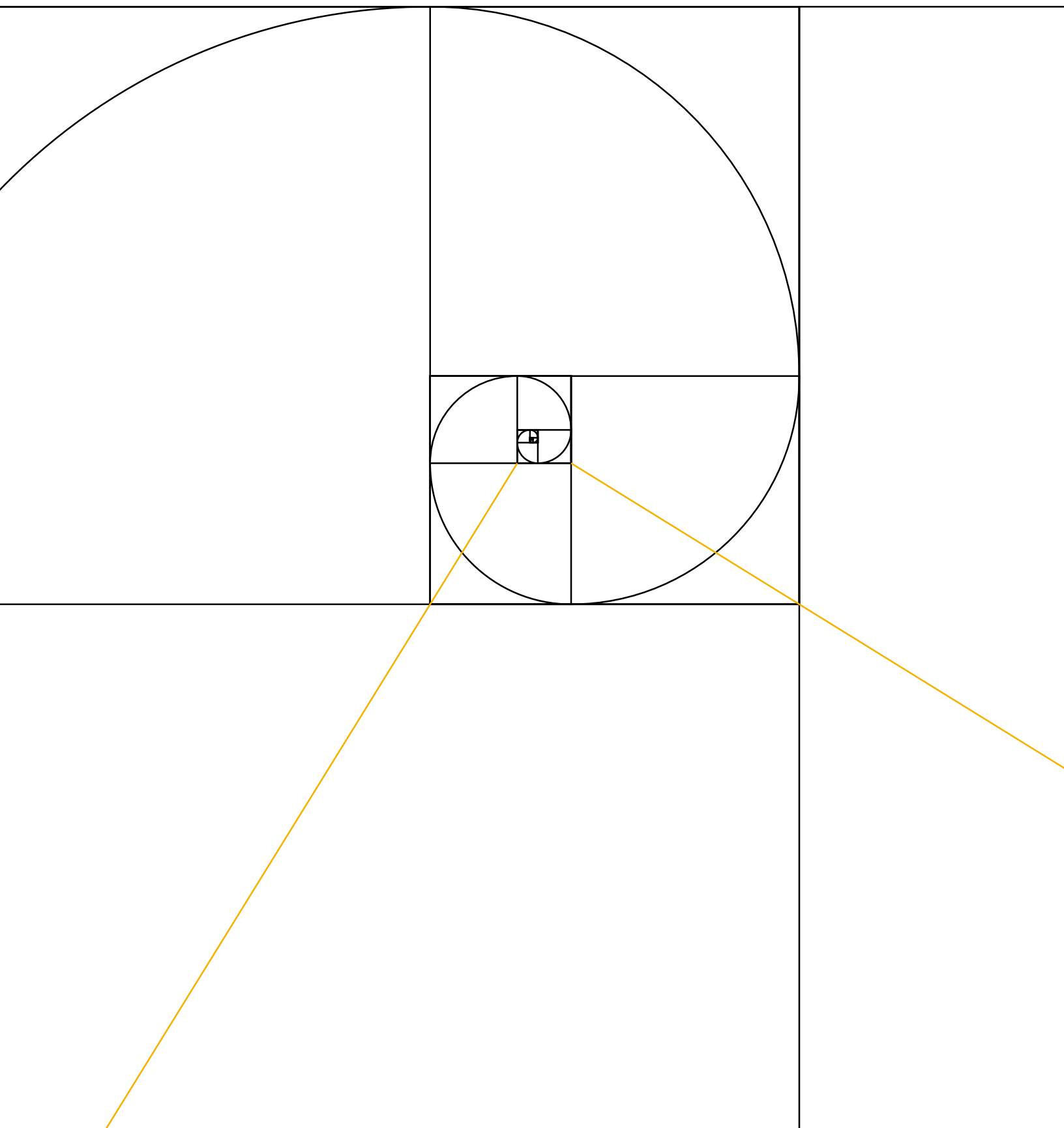


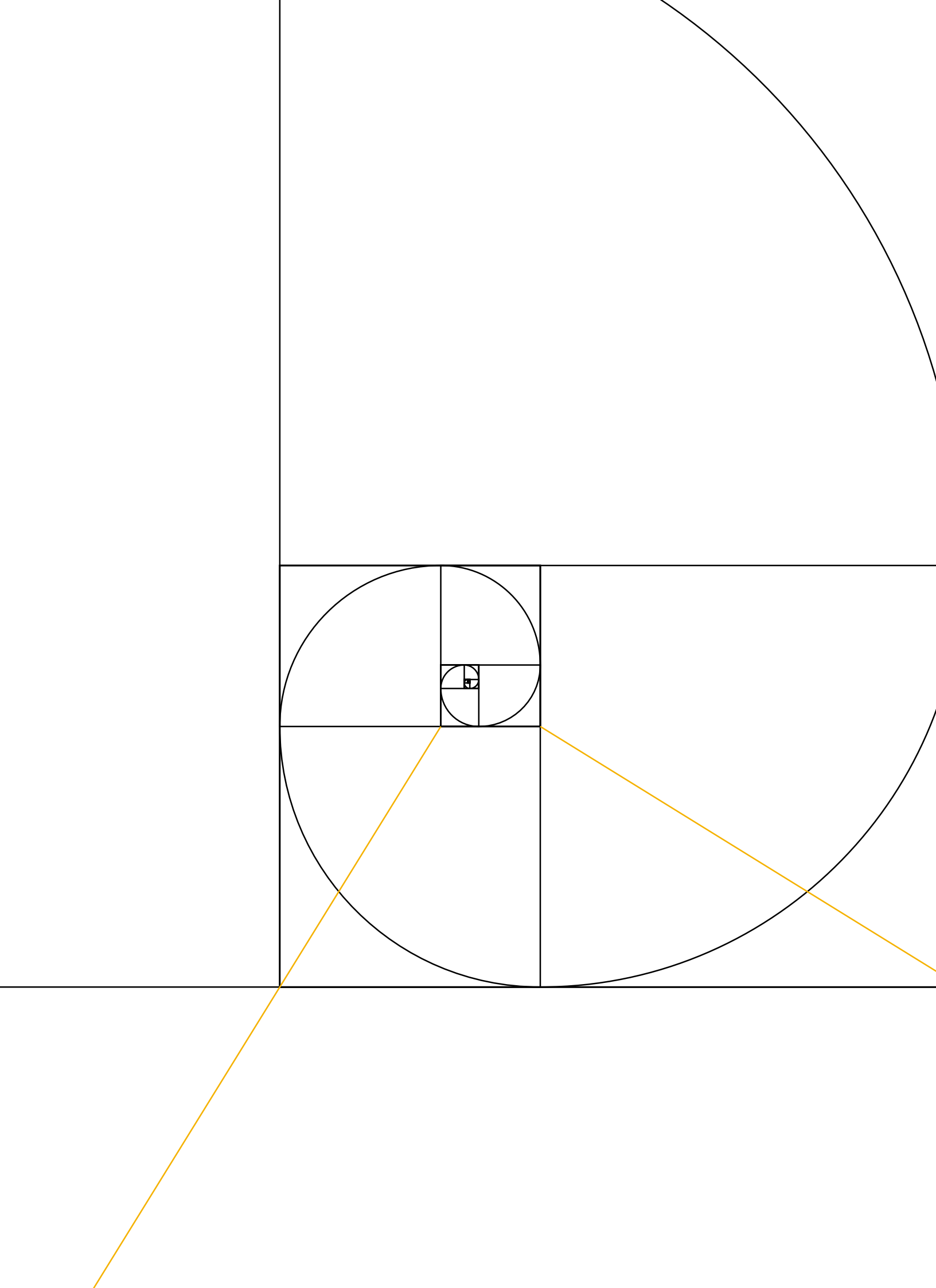
Irrationality

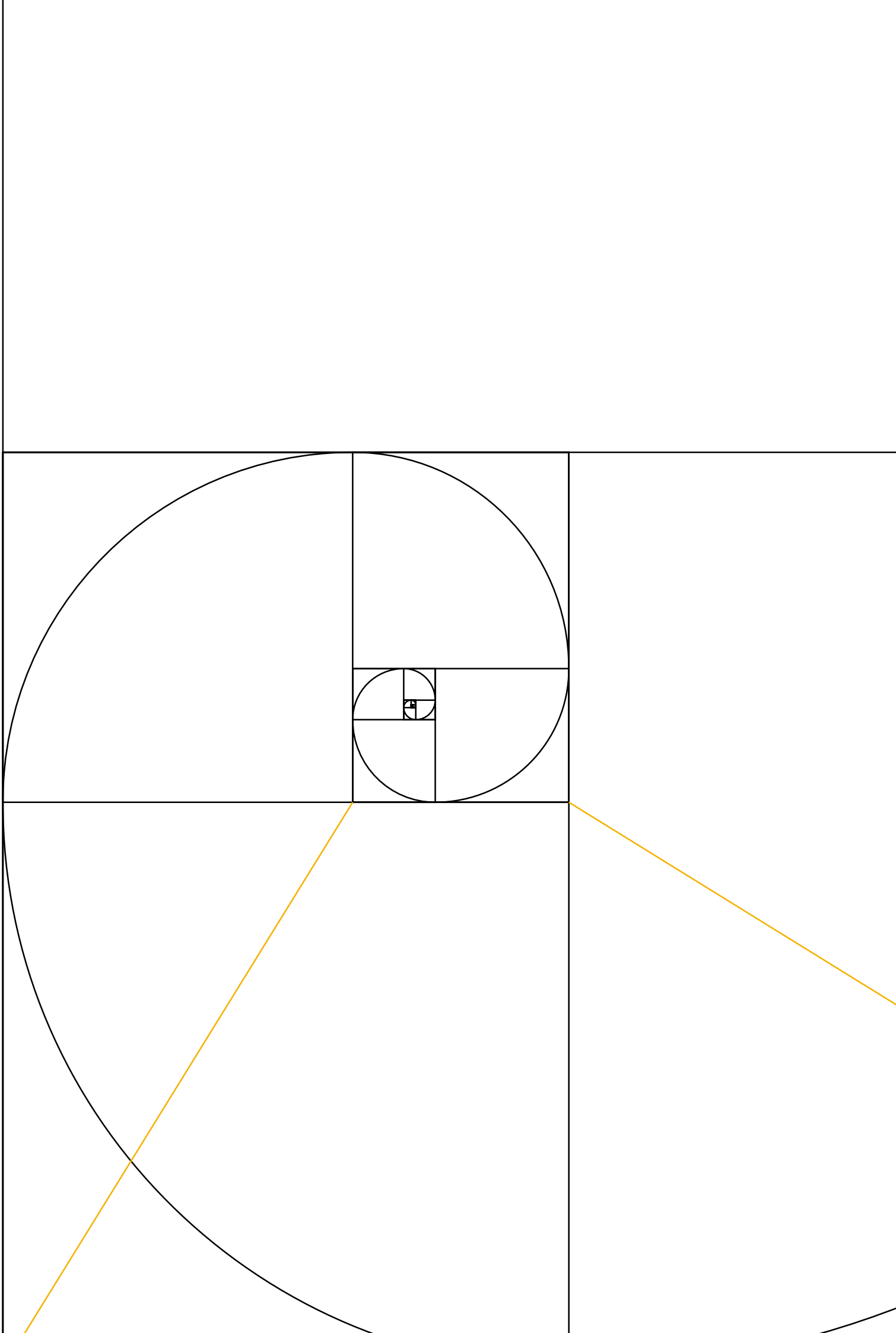
The sides of the bottom triangle converge;
piece by piece adding a smaller golden diagonal
each time as shown in the depiction that follows.
Therefore, the sides which are in the golden ratio
can be written as the sum of an infinite series
and therefore the golden ratio is irrational.
The golden ellipse is drawn so that
the scaling can be followed.

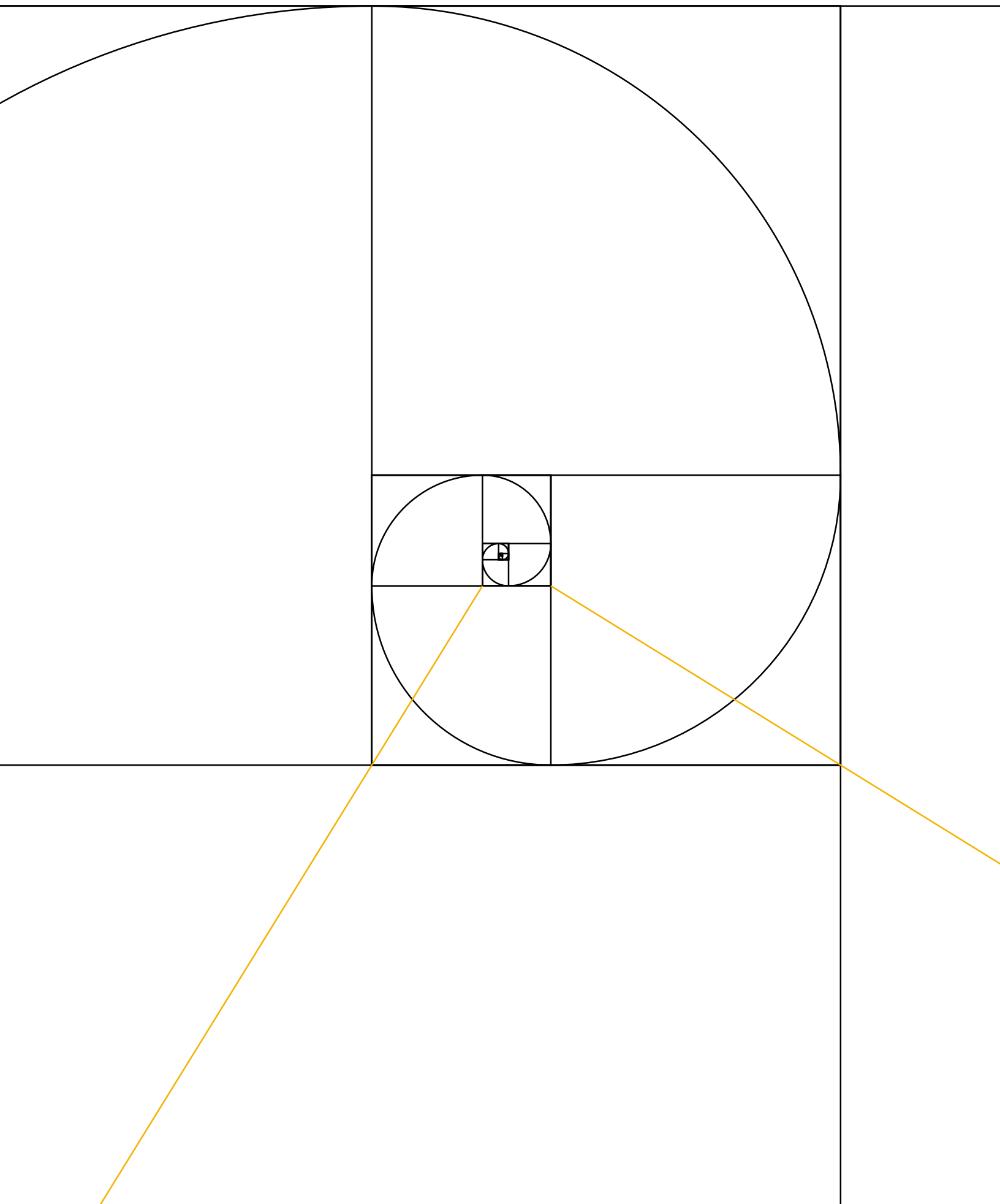


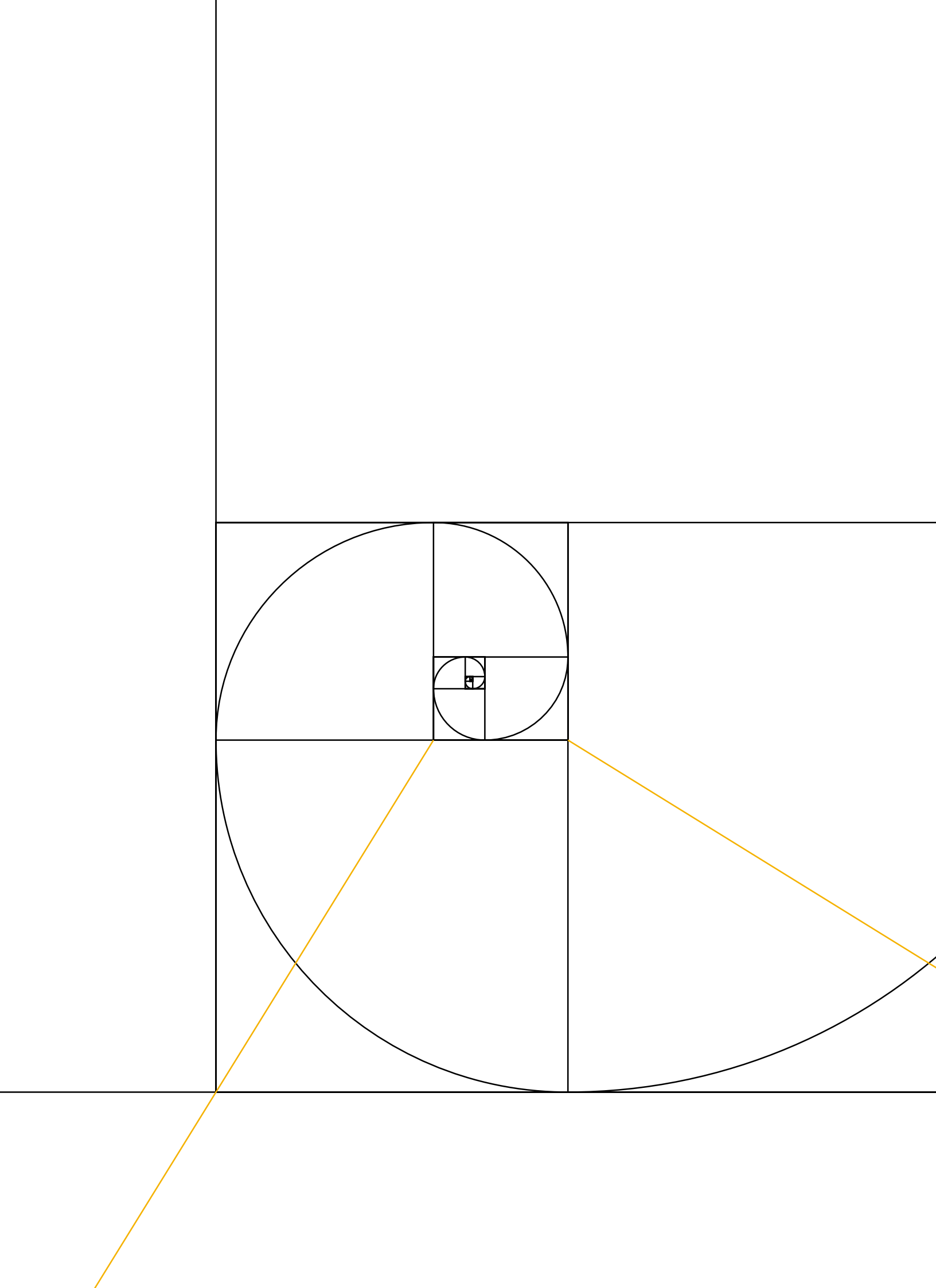


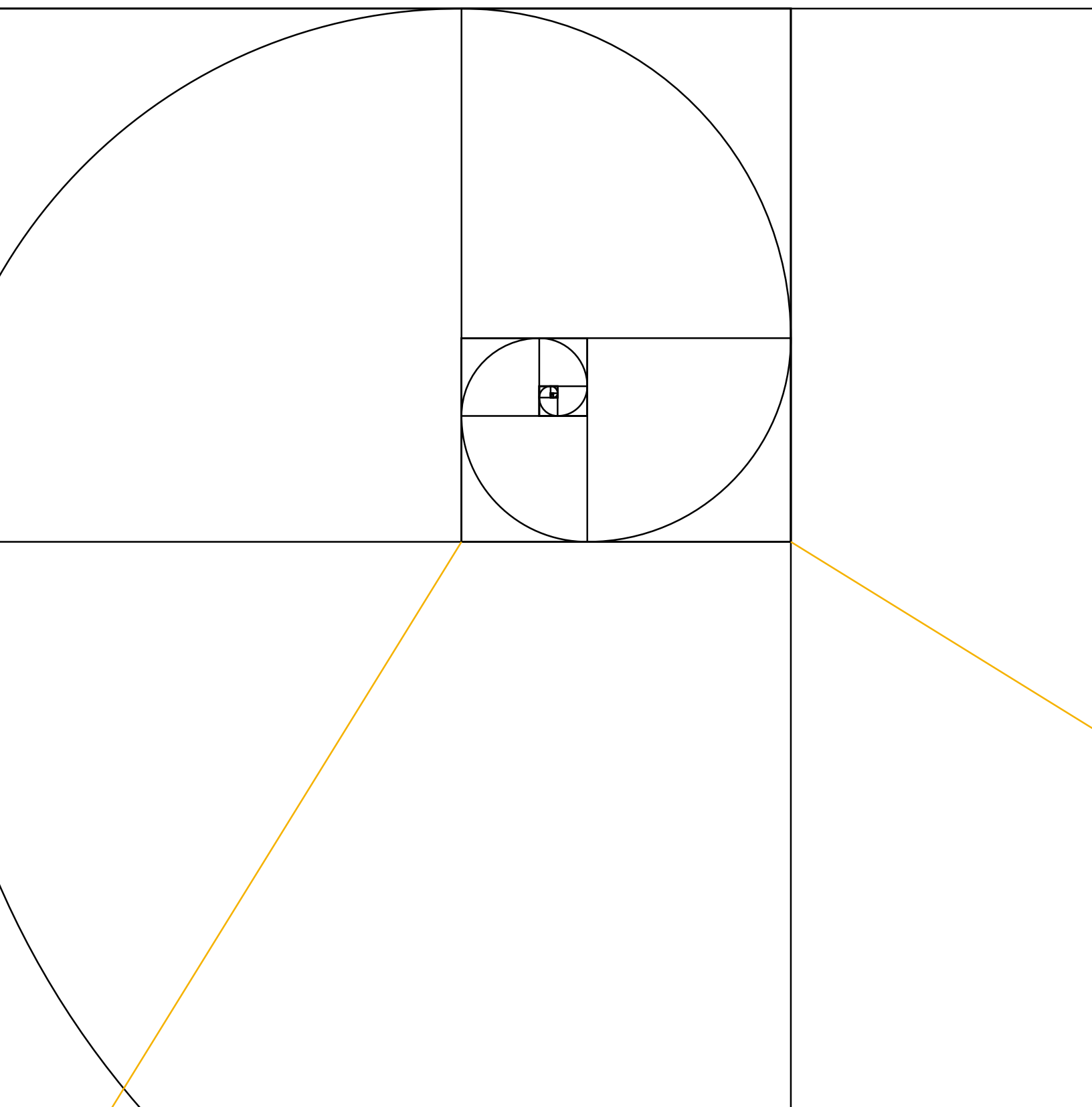


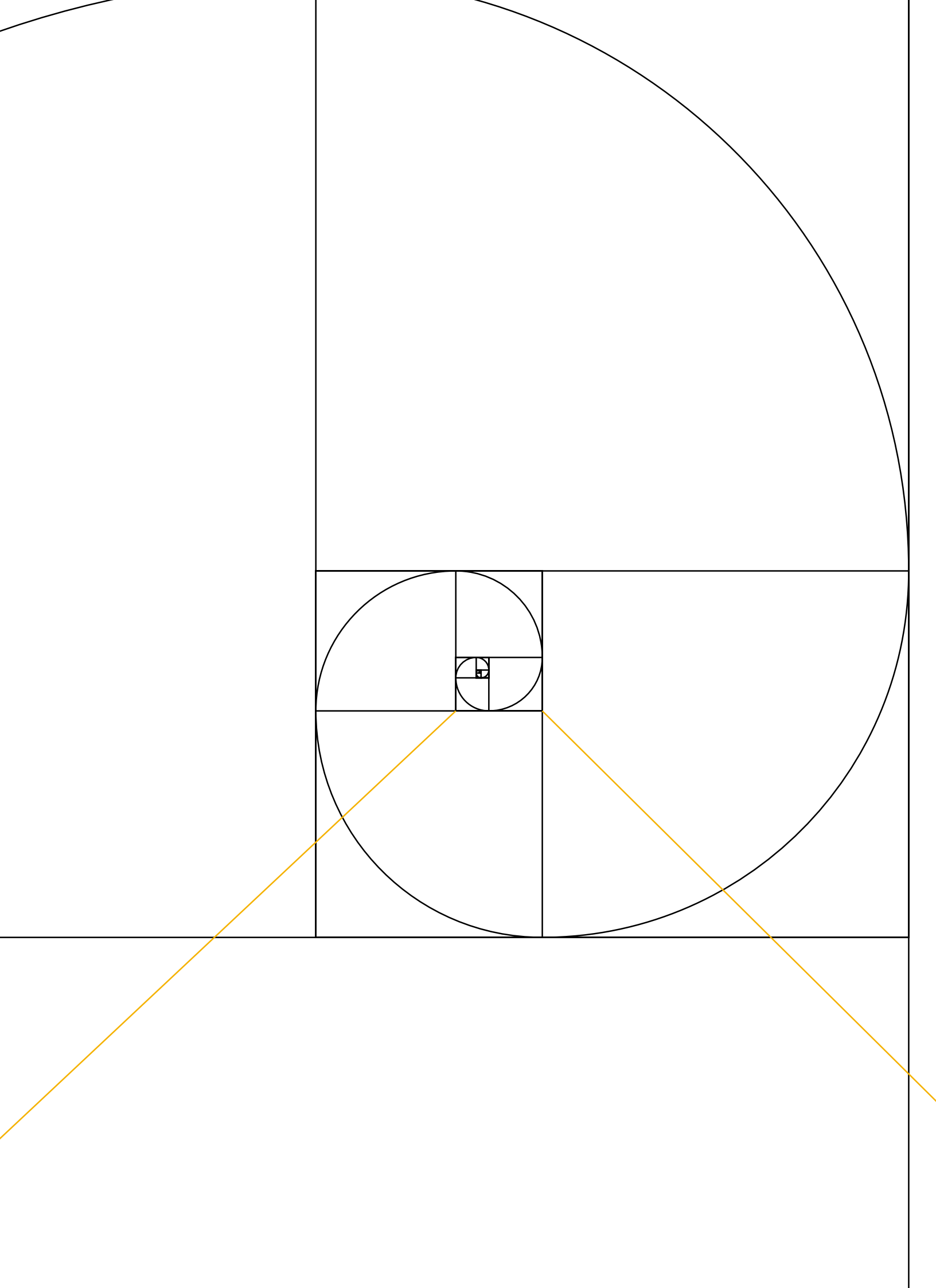


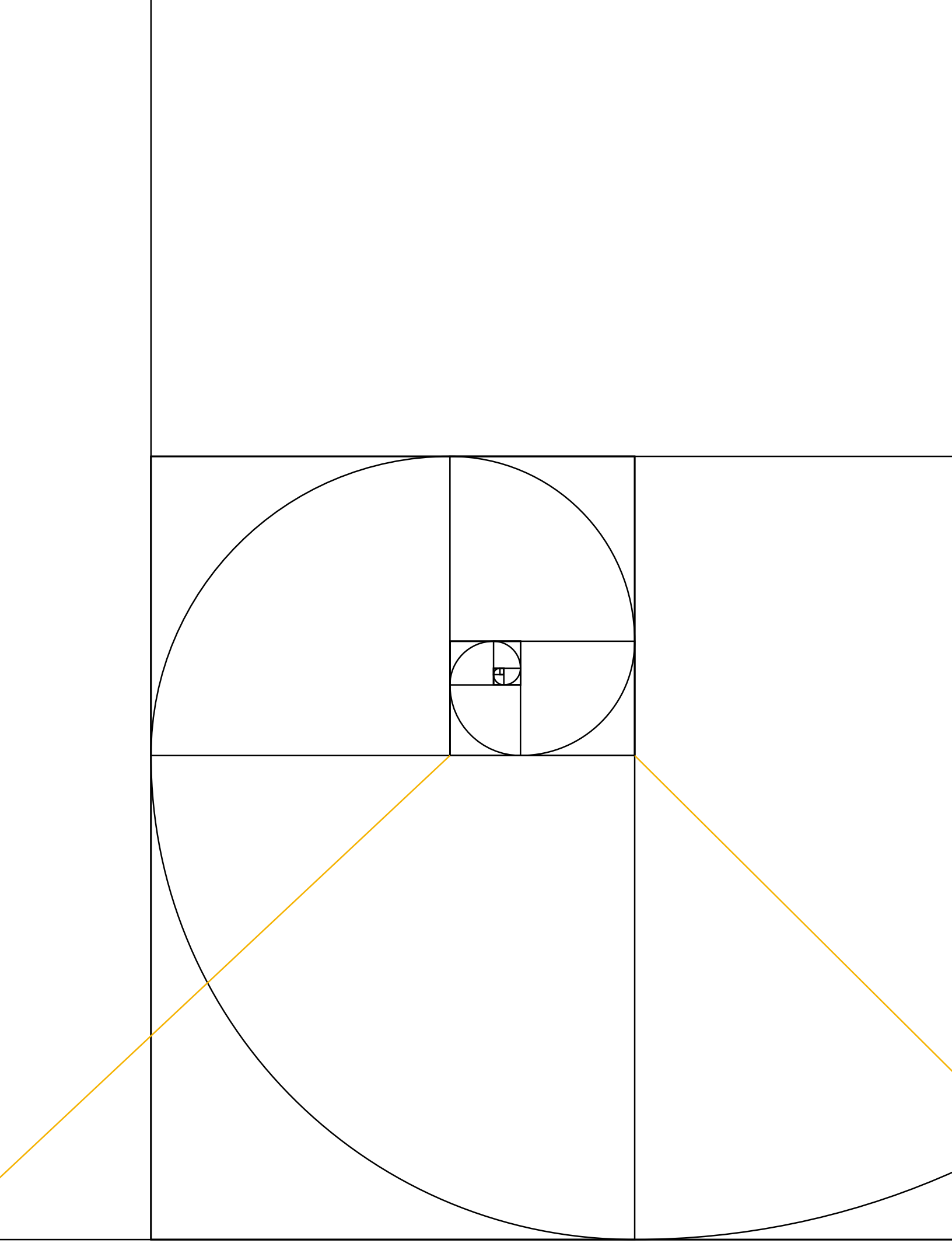












The End