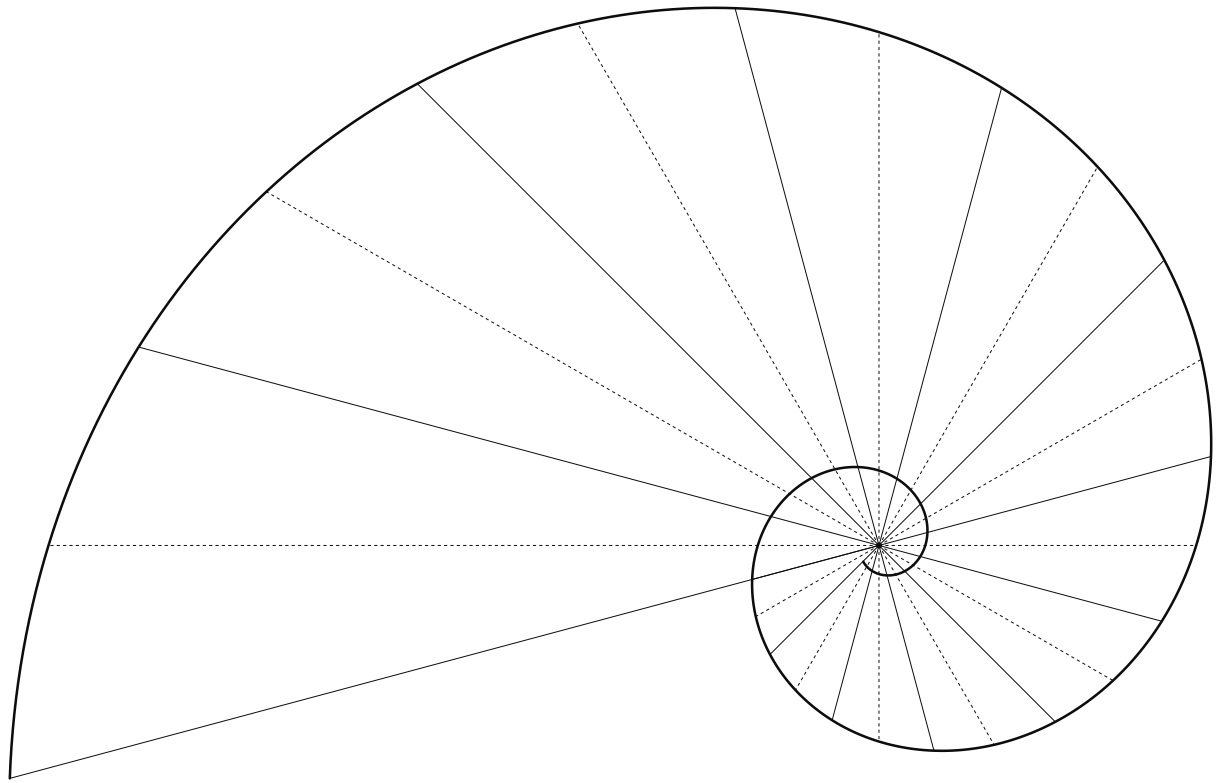
Spira Mirabilis

Carlos Luna Mota



mmaca

Maths are useful...

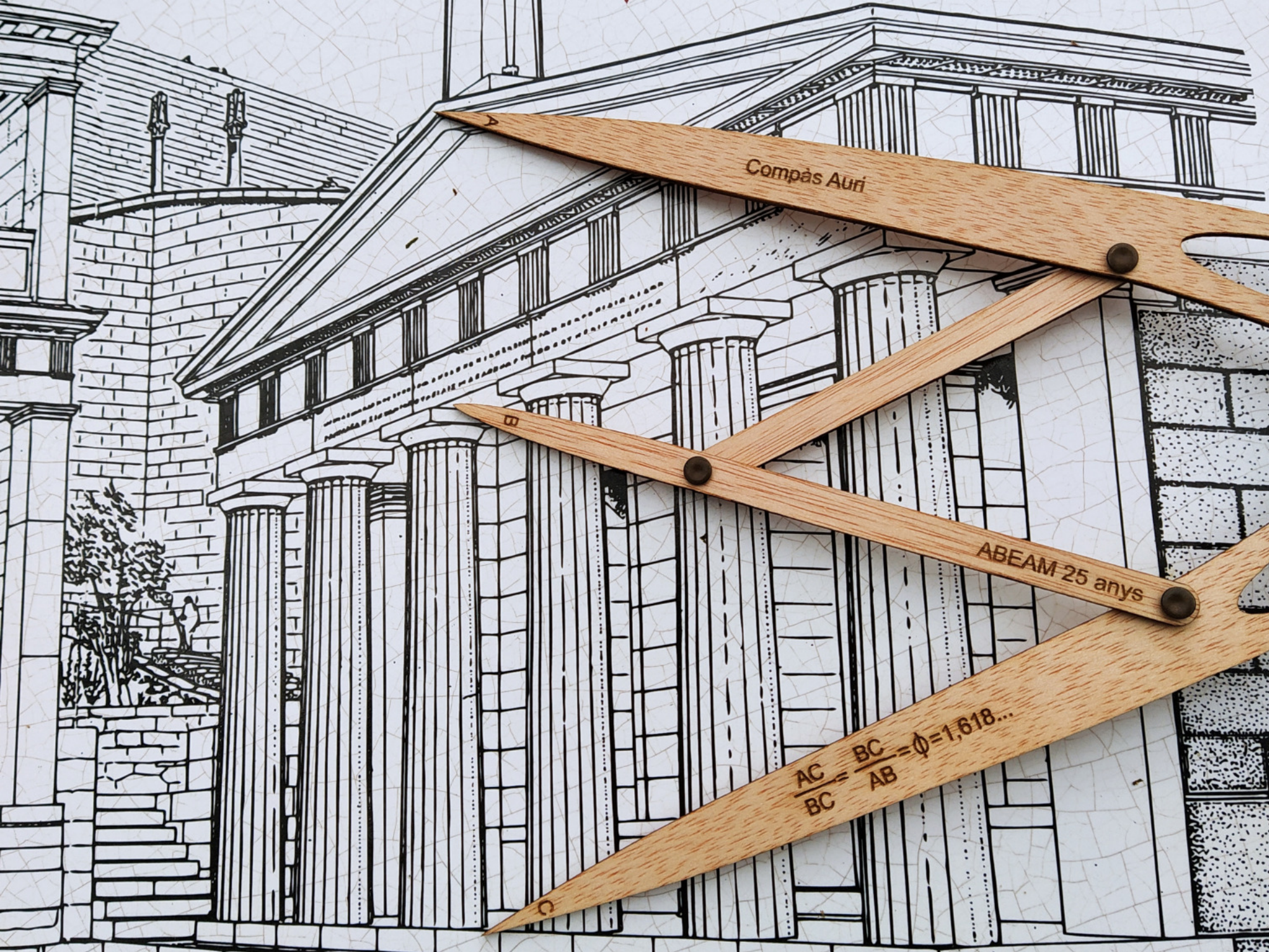
So what?

Amazement $\Rightarrow$ **Engagement** $\Rightarrow$ **Joy**

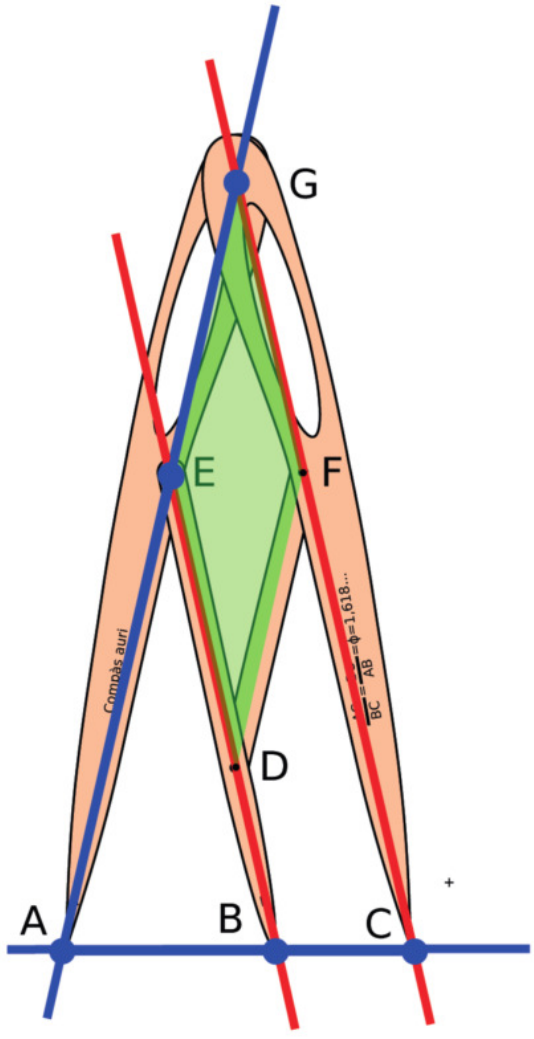
Maths should be exciting!


A
Compàs Auri
B
ABEAM 25 anys
C
$\frac{AC}{BC} = \frac{BC}{AB} = \phi = 1{,}618...$


A
B
C


A
Compàs Auri
B
ABEAM 25 anys
C
$\frac{AC}{BC} = \frac{BC}{AB} = \phi = 1{,}618...$

A perfect STEAM project!



Science ✓

Technology ✓

Engineering ✓

Art ✓

Maths ✓

In too many STEAM projects... The M is silent!

But...

A

B

C

CatSalut

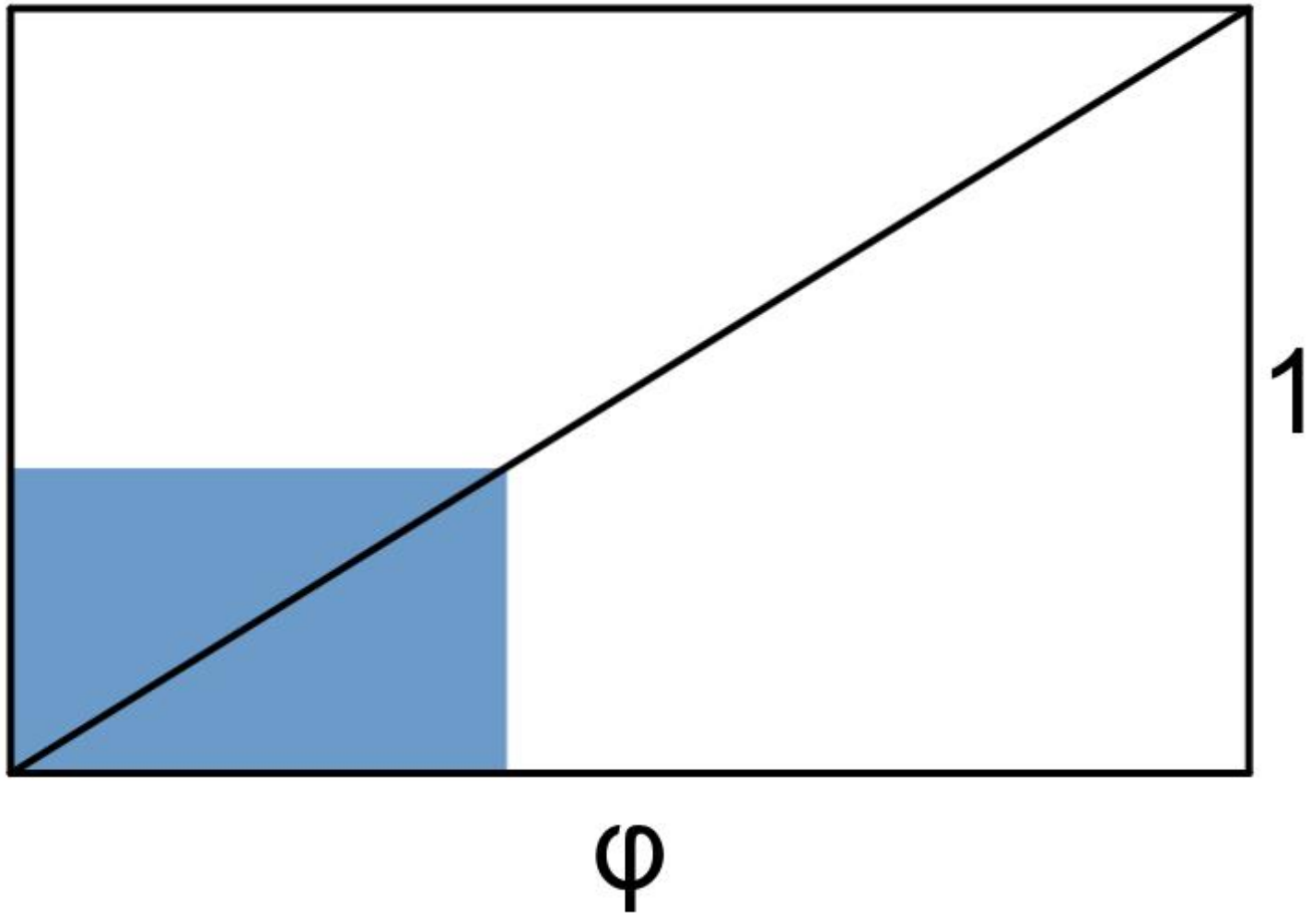
Servei Català de la Salut

Generalitat de Catalunya

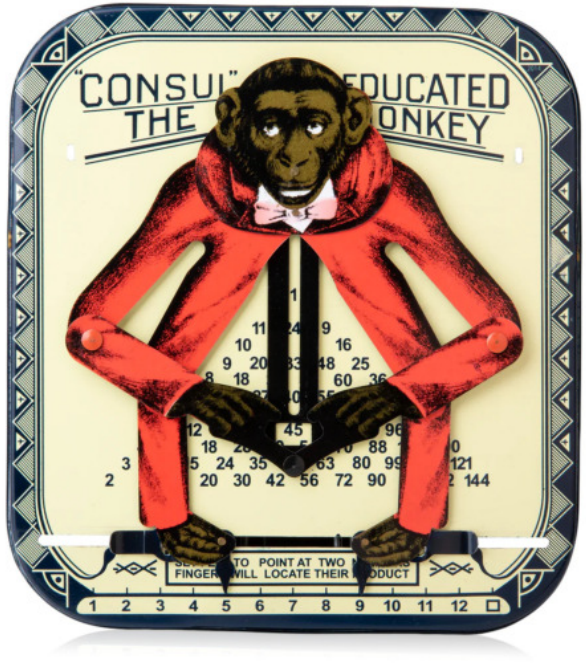
Departament de Salut

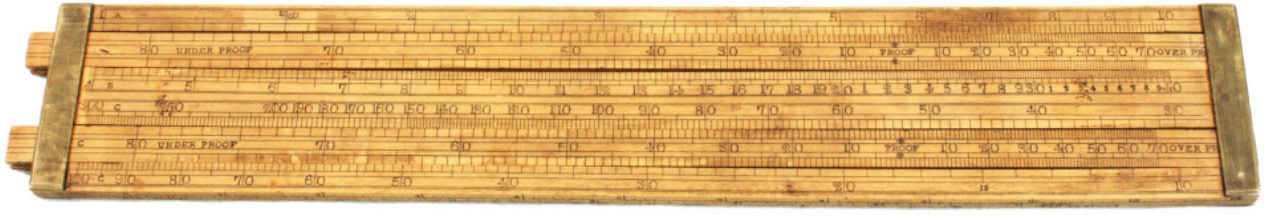
VISA

The solution that amazed... no one

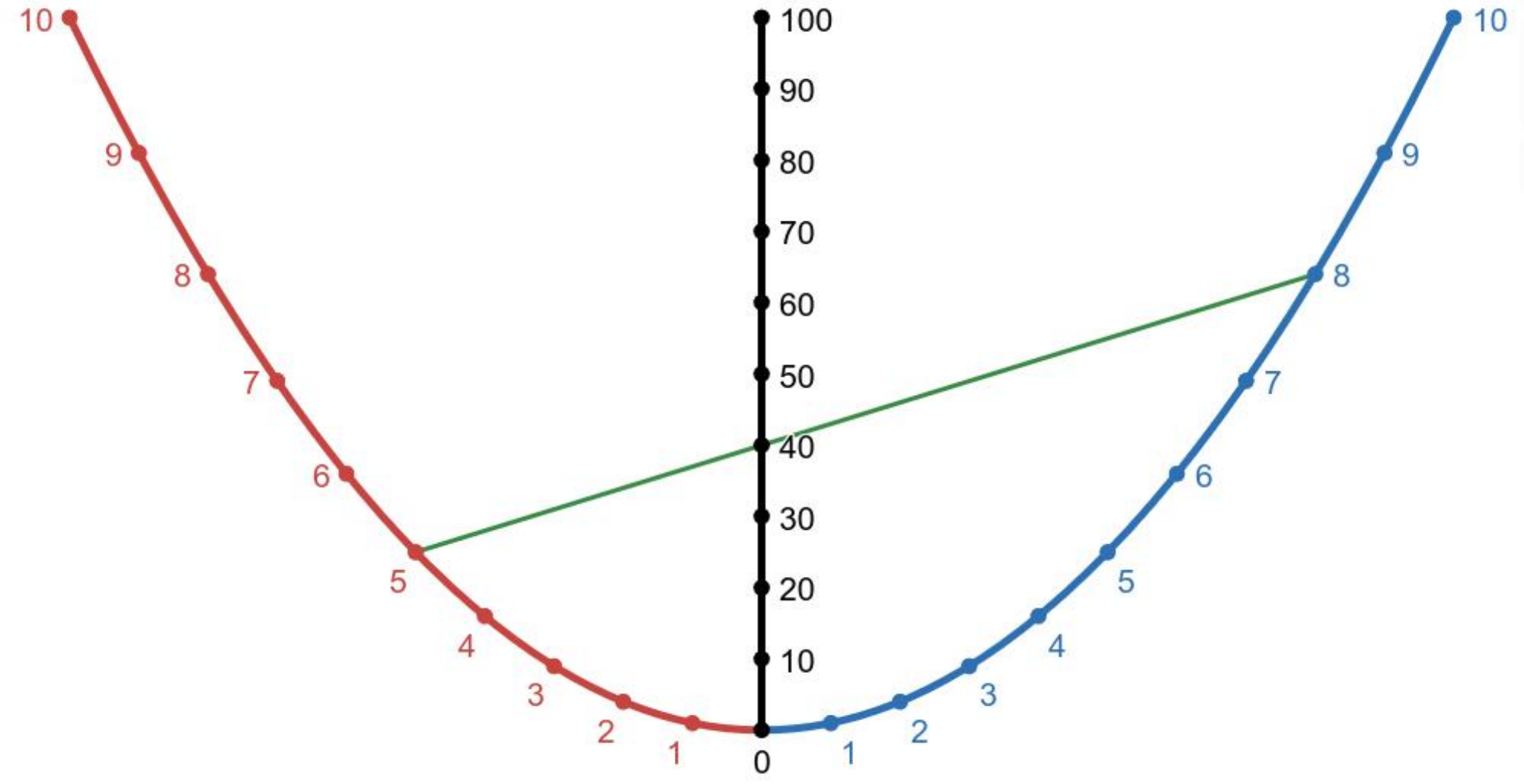


Analog computers



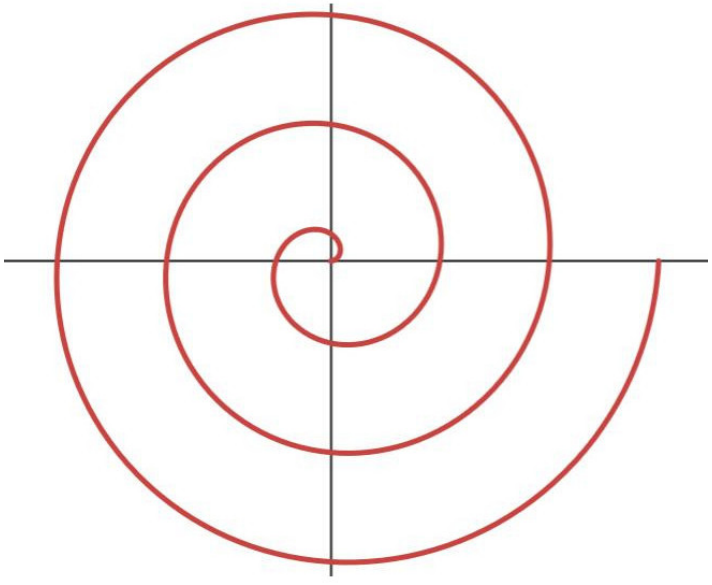


Nomograms



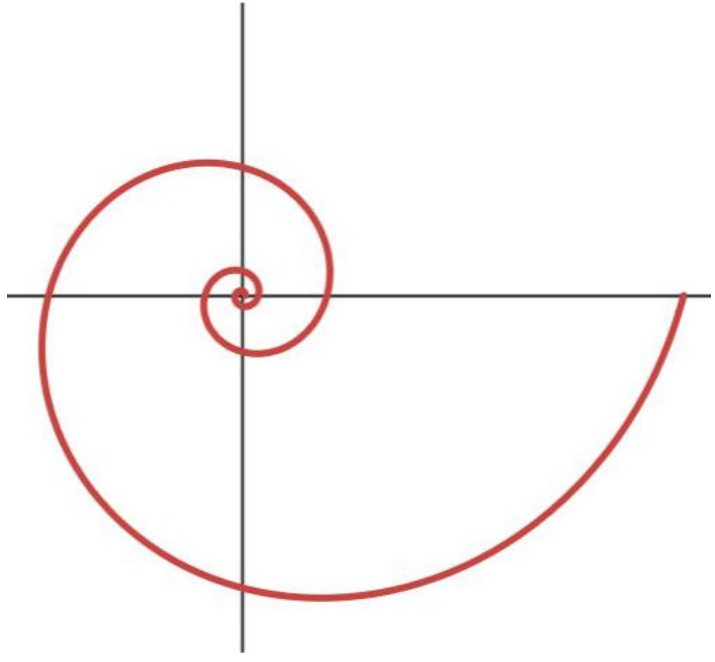
Two spirals that compute!

Archimedean



$$r = \lambda \cdot \alpha$$

Logarithmic



$$r = \lambda^{\alpha}$$

Two spirals that compute!

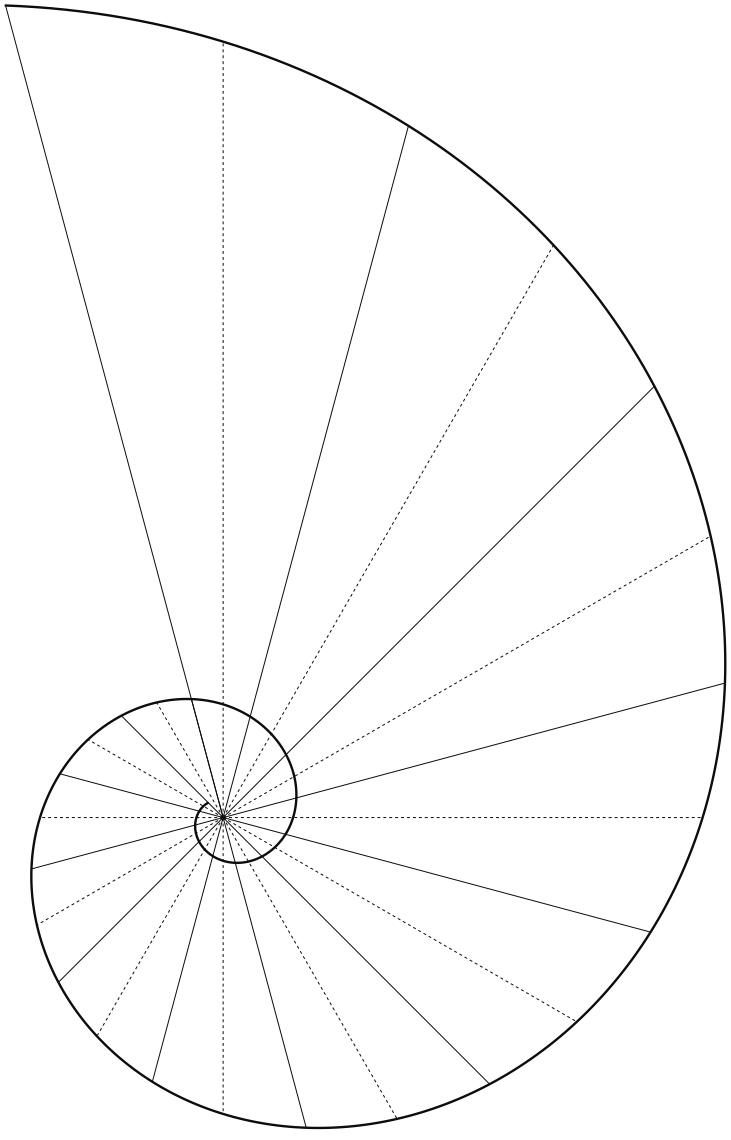
Archimedean

$$r = \lambda \cdot \alpha$$

Logarithmic

$$r = \lambda^{\alpha}$$

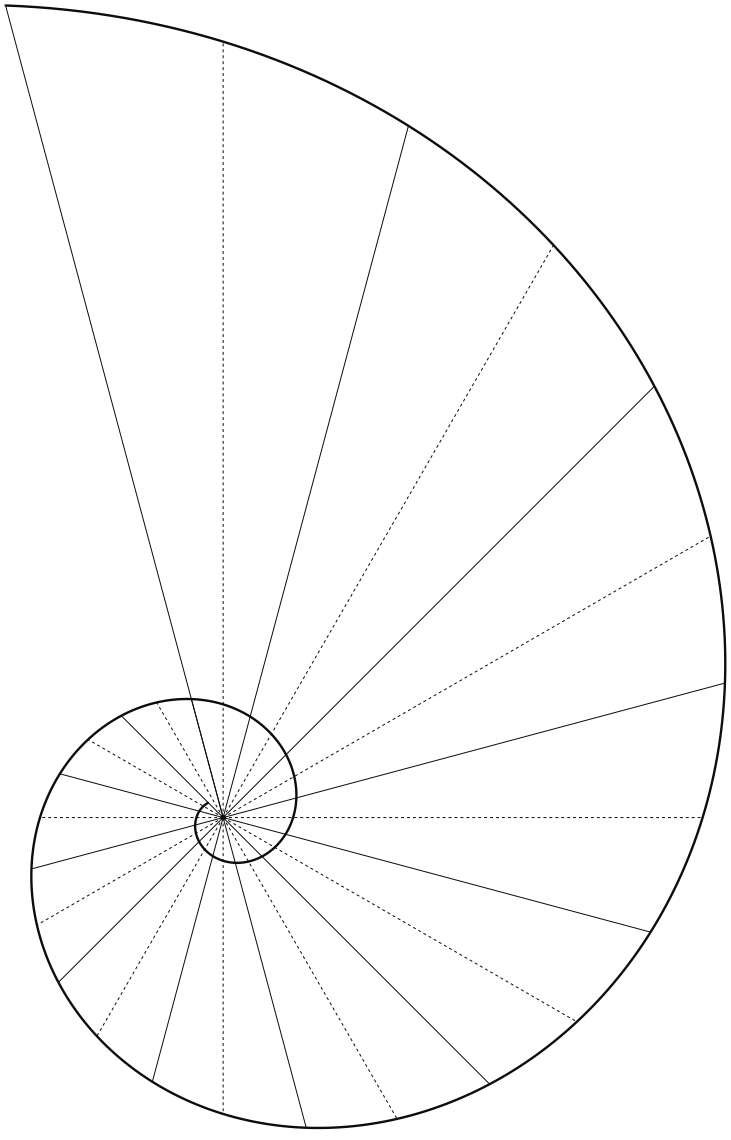
Spira Mirabilis!



History:

- Described by **Albrecht Dürer** (1525)
- Studied by **René Descartes** (1638)
- Named *Spira Mirabilis* by **Jakob Bernoulli** (1692)

Spira Mirabilis!



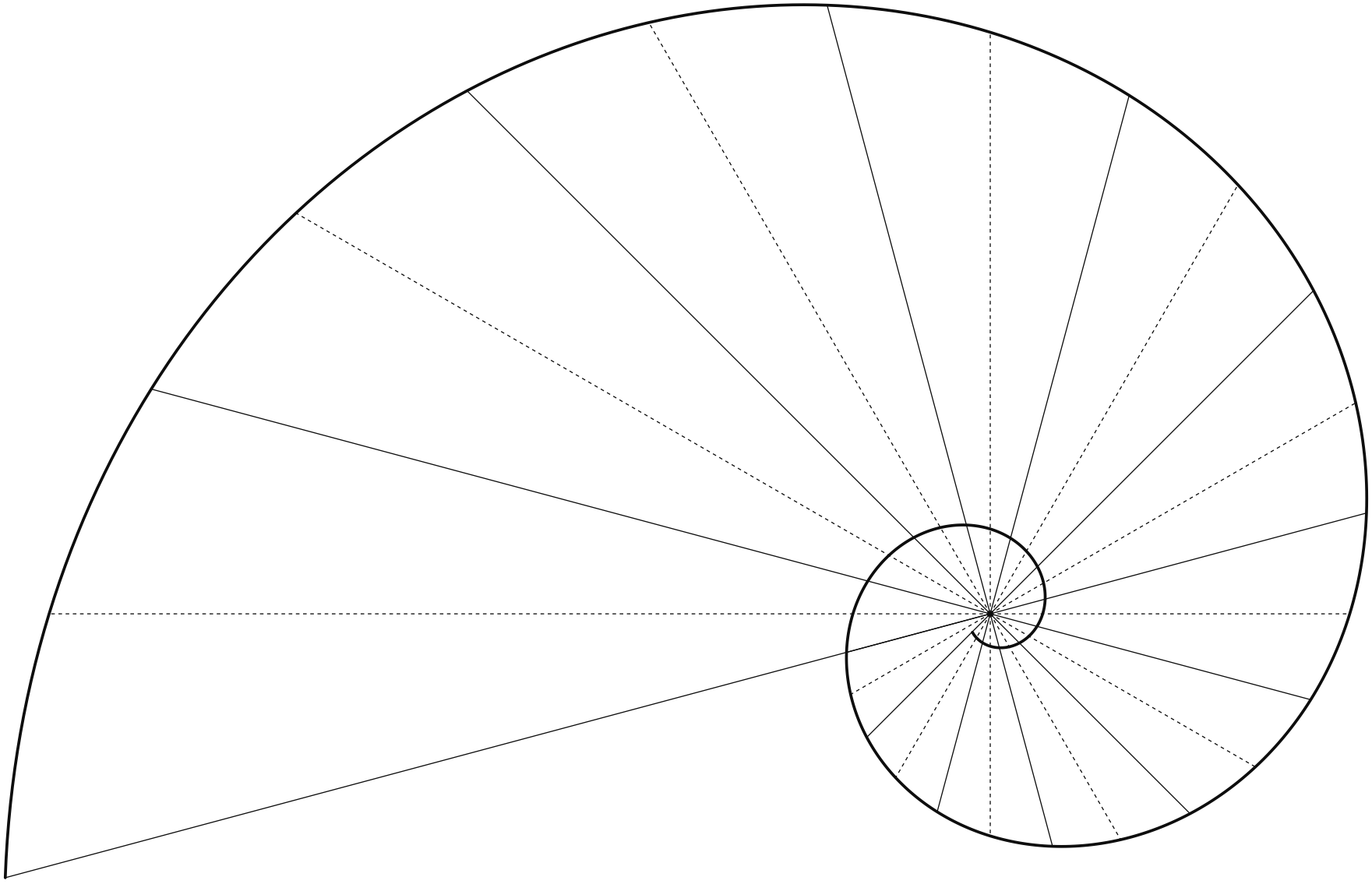
Properties:

- It has a **center**,
  but never reaches it!
- It maintains a **constant angle**
  between tangents and radii
- **Rotating** $=$ **Scaling**

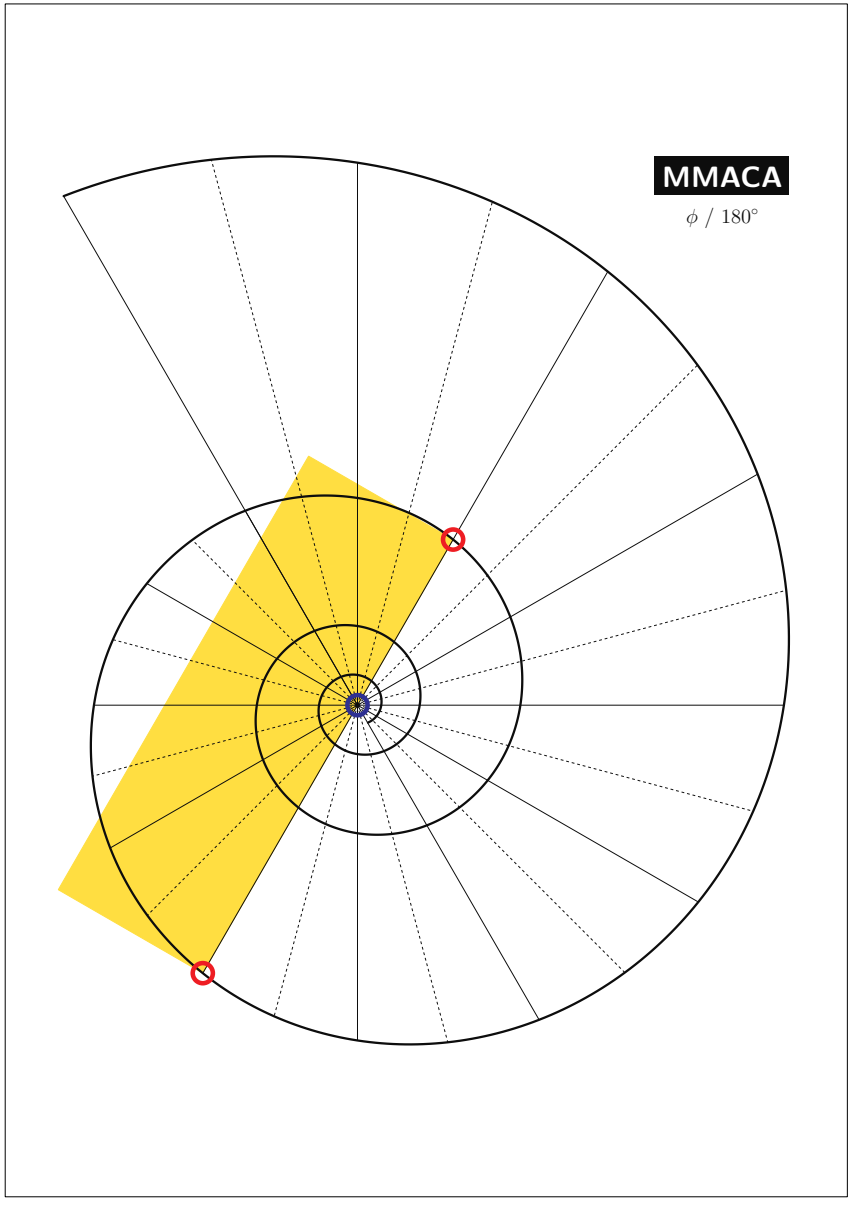

C. S.
IACOBUS BERNOULLI
MATHEMATICUS INCOMPARABILIS
ACAD. BASIL.
VLTRA XVIII. ANNOS PROF.
ACADEM. ITEM REGIÆ PARIS. ET BEROLIN.
SOCIUS
EDITIS LUCUBRAT. INLUSTRIS.
MORBO CHRONICO
MENTE AD EXTREMUM INTEGRA
ANNO SAL. CIↃIↃCCV. D. XVI AUGUSTI
ÆTATIS L.M.VII.
EXTINCTUS
RESURRECT. PIOR. HIC PRÆSTOLATUR
IUDITHA STUPANA
XX ANNOR. VXOR
CUM DUOBUS LIBERIS
MARITO ET PARENTI
EHEU DESIDERATISS.
H. M. P.
RESURGO EADEM MUTATA

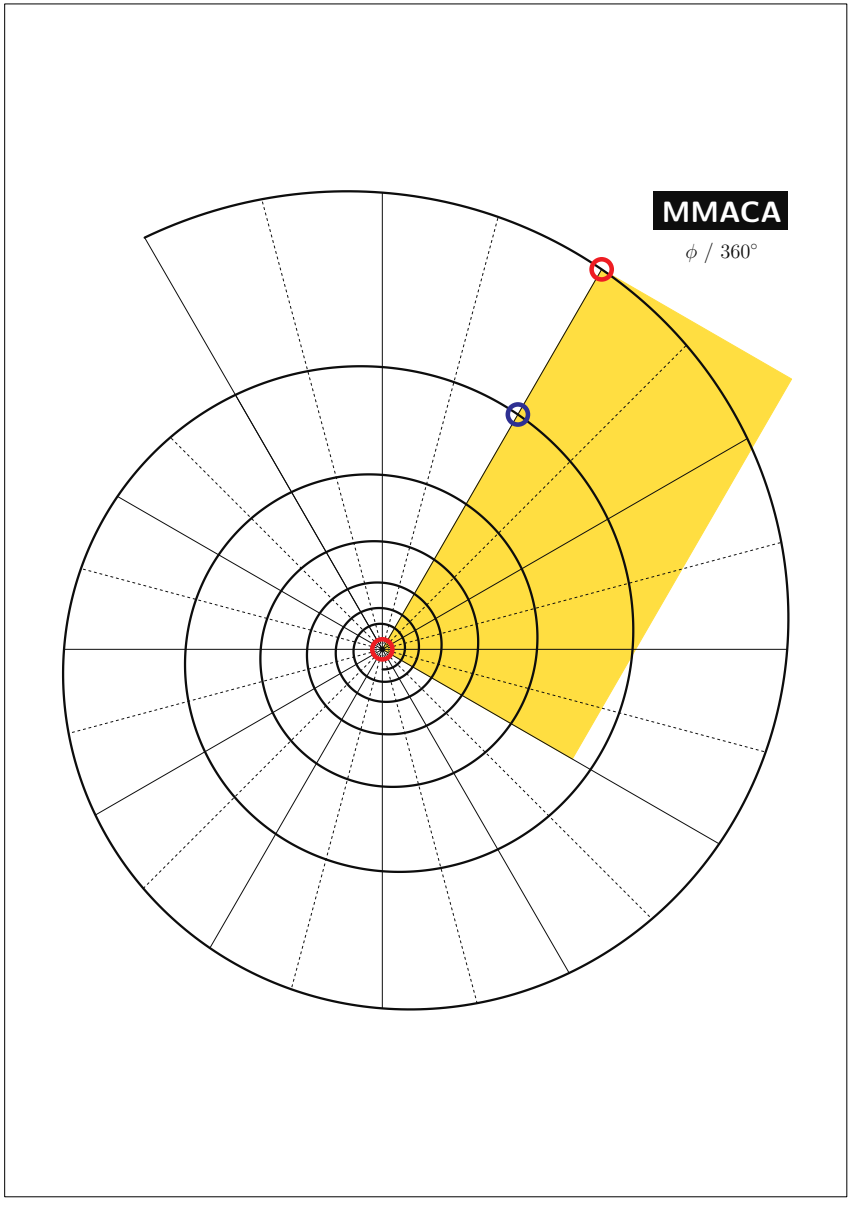

RESURGO EADEM MUTATA

Spira Mirabilis!

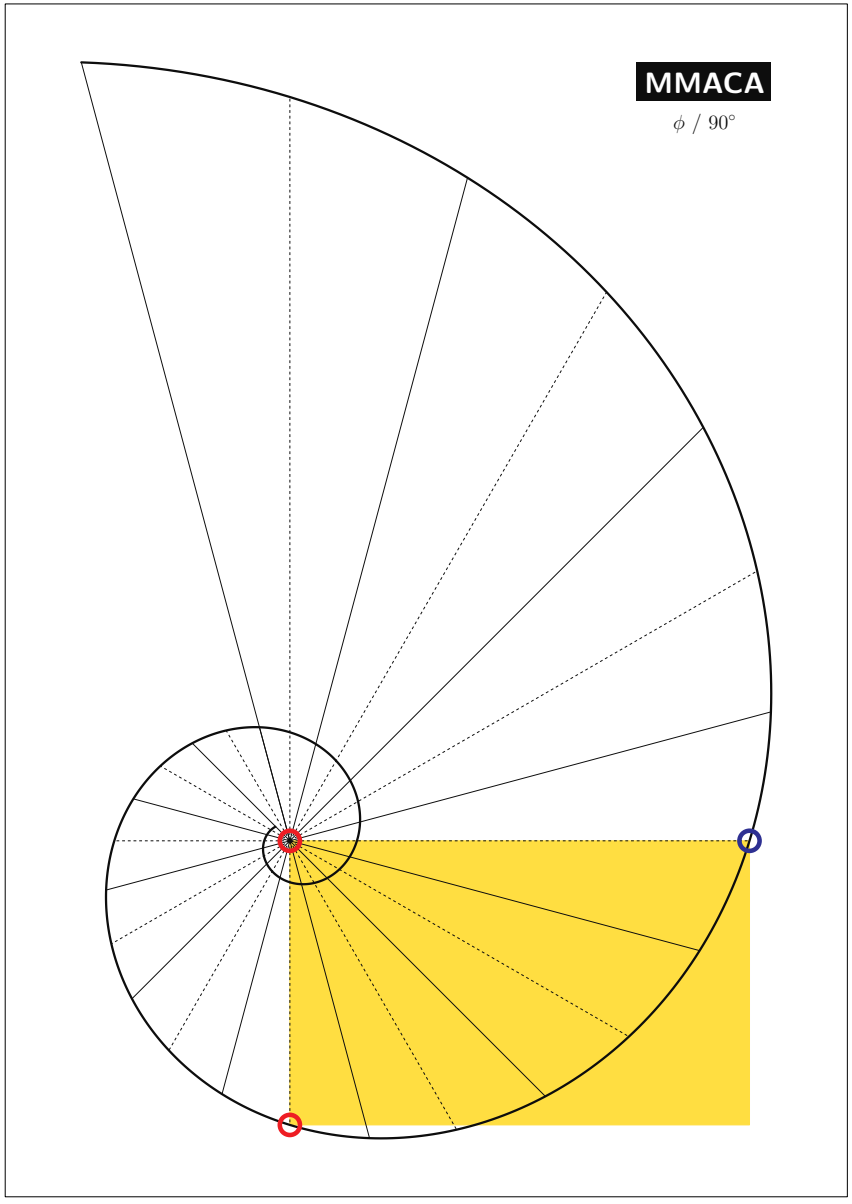


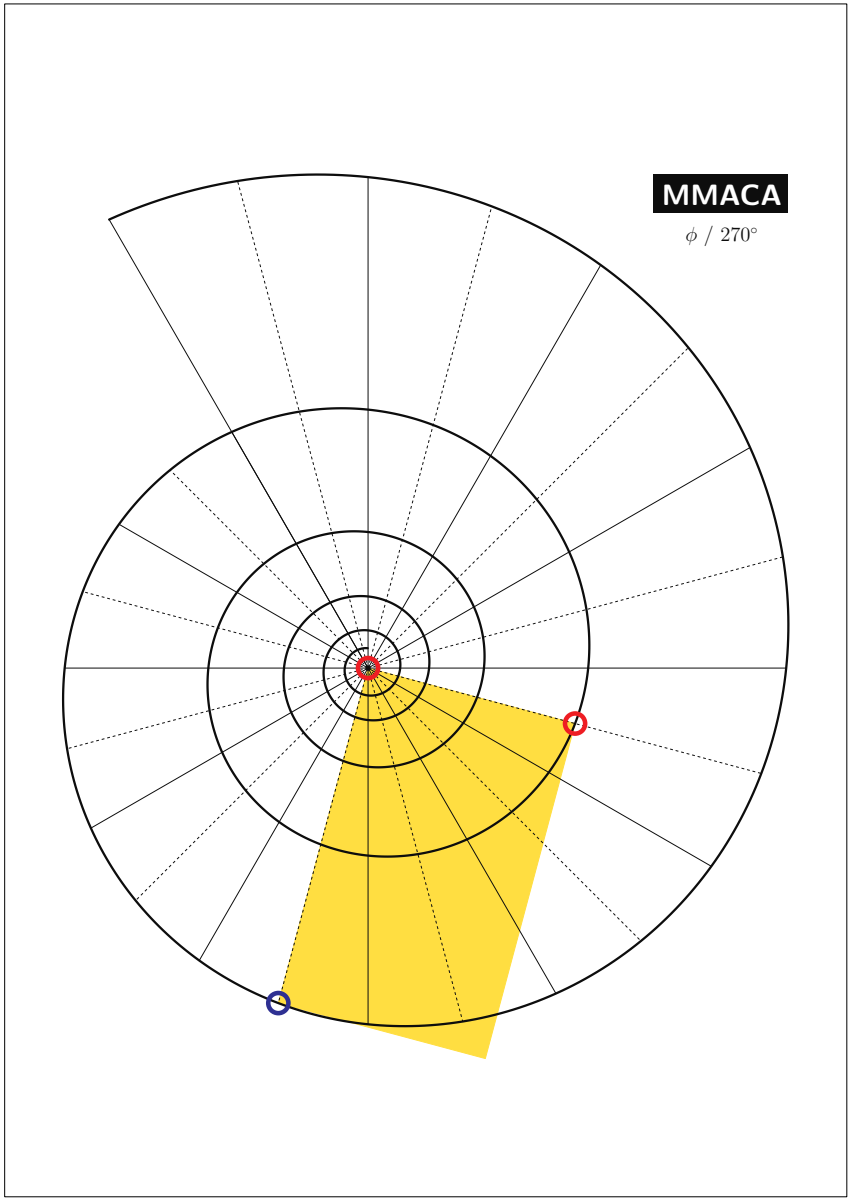
The ϕ / 180° and ϕ / 360° spirals



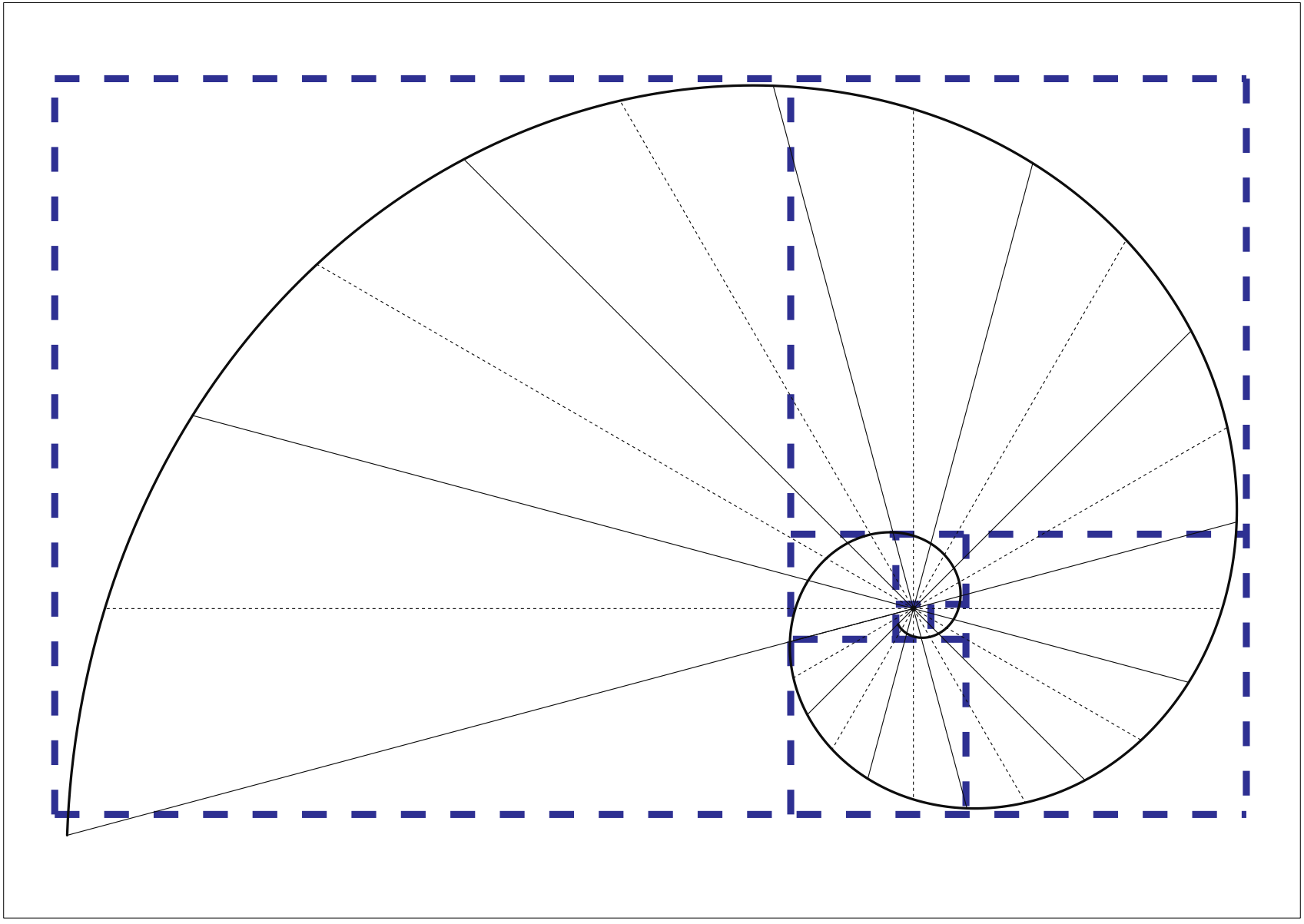


The ϕ / 90° and ϕ / 270° spirals

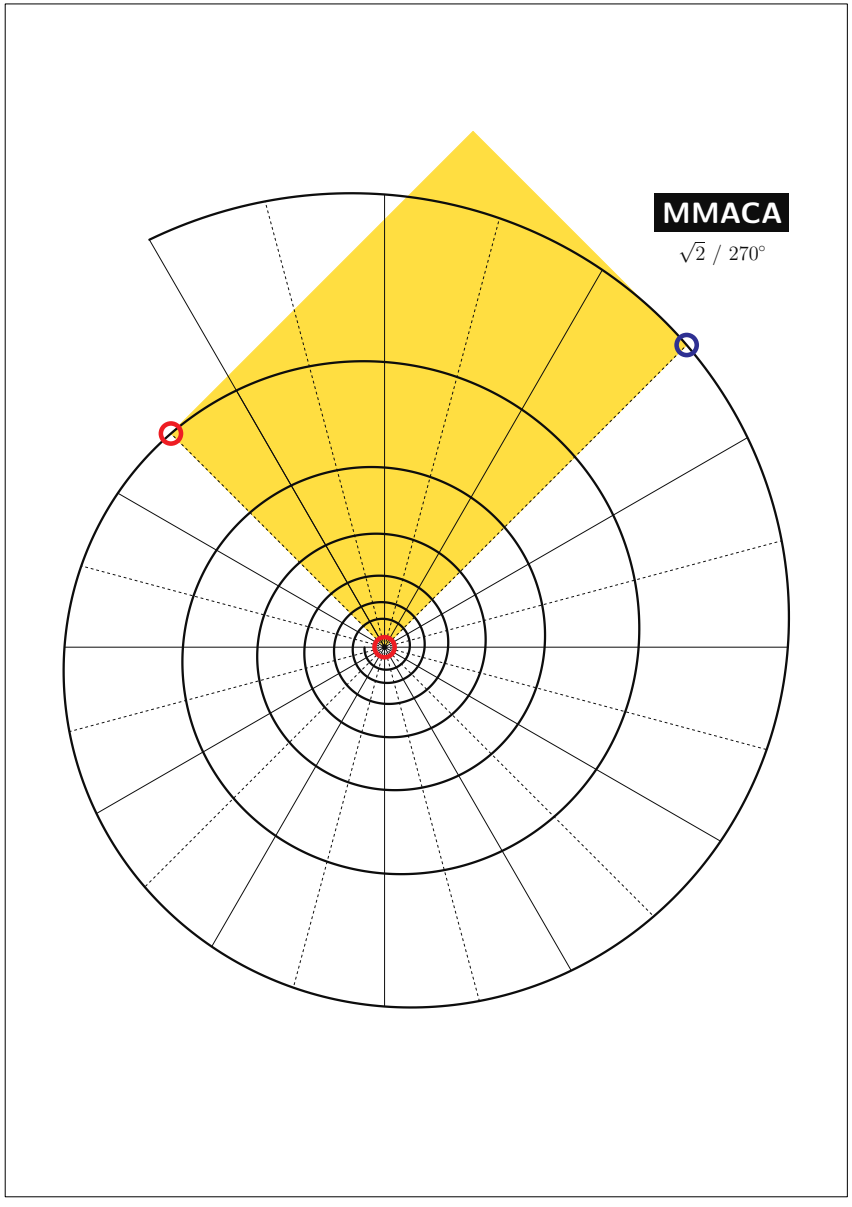


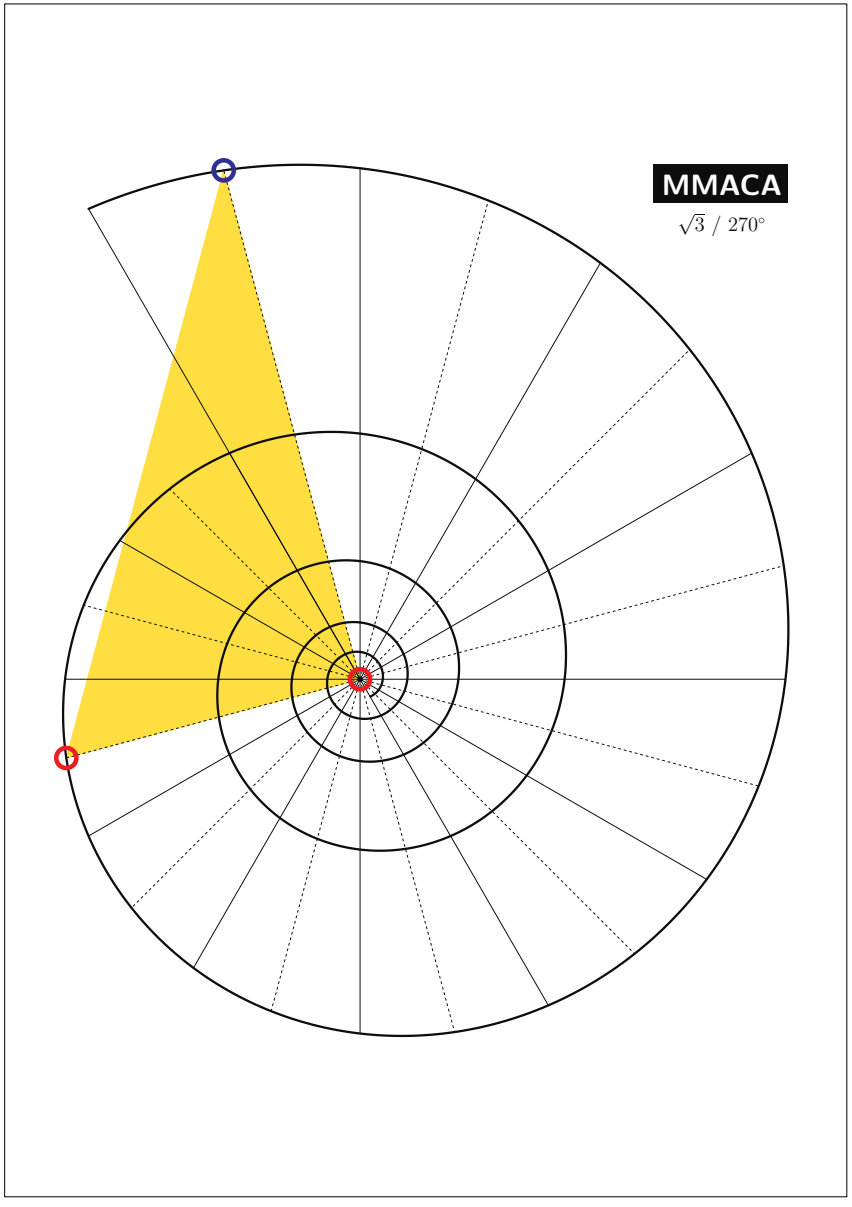


Fibonacci Spiral $\approx$ the ϕ / 90° spiral

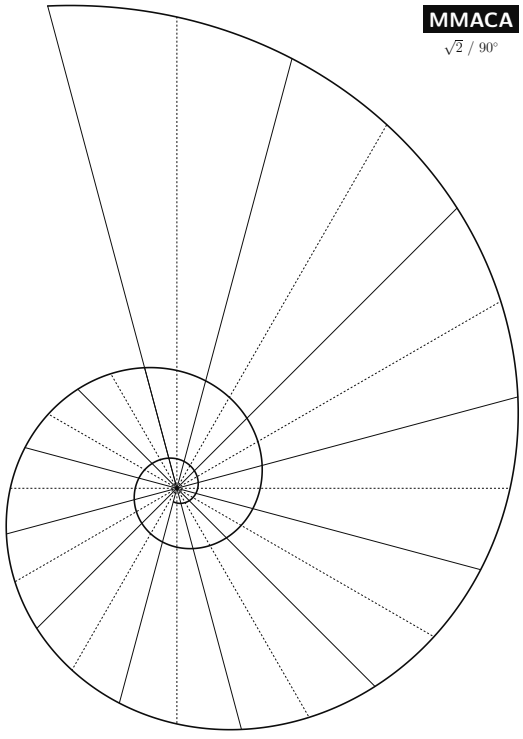


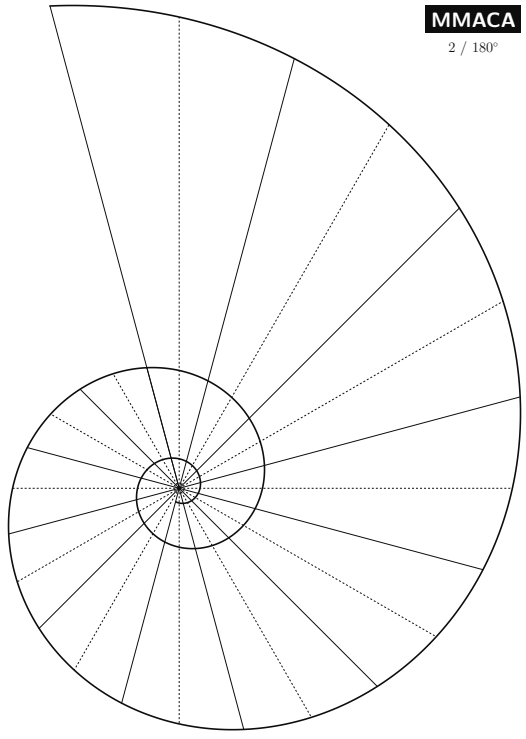
The $\sqrt{2}$ / 270° and $\sqrt{3}$ / 270° spirals

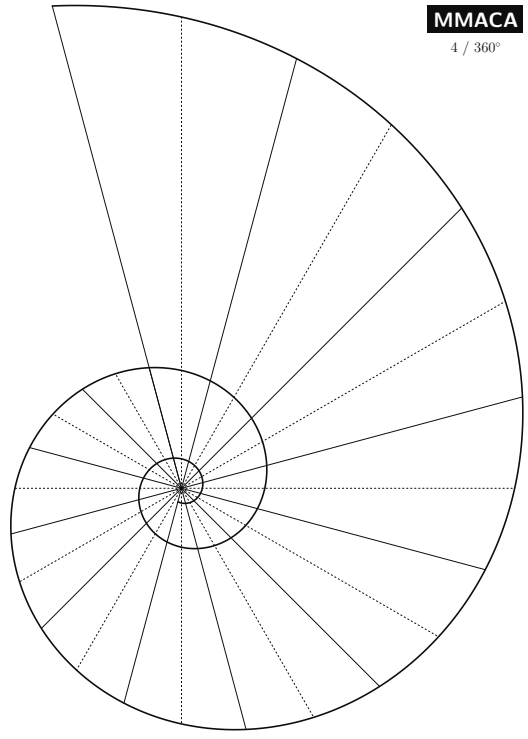




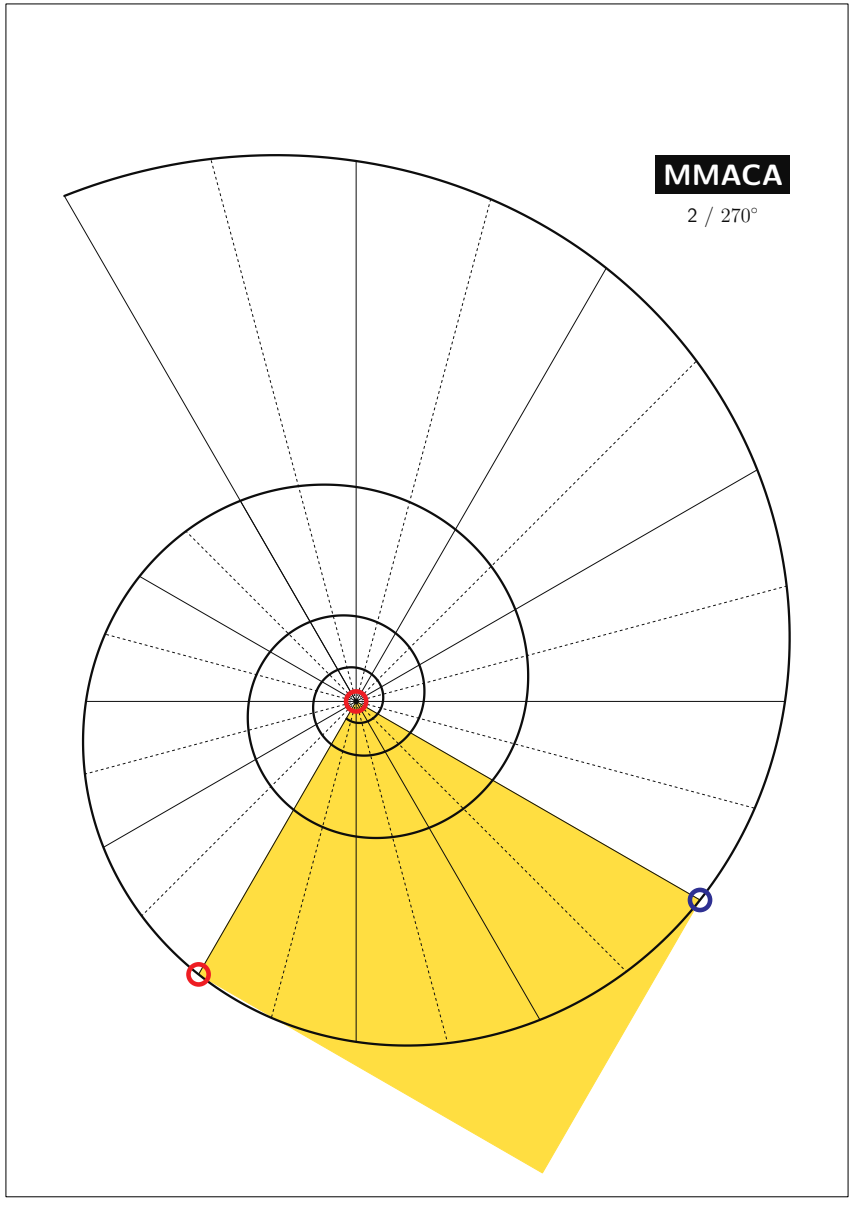
$\sqrt{2}$ / 90° = 2 / 180° = 4 / 360°

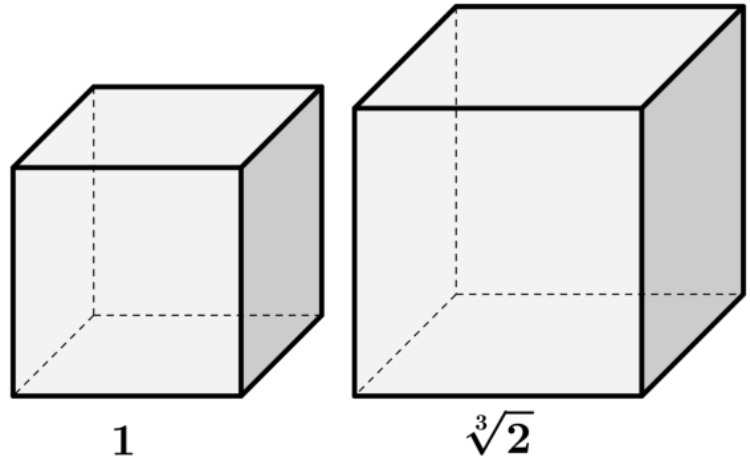






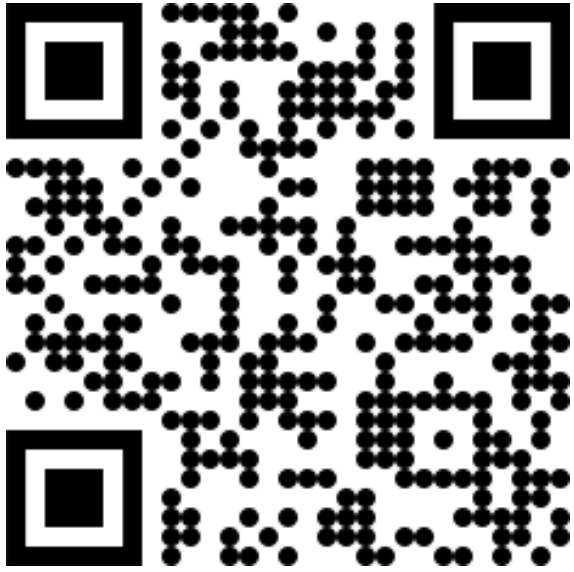
Doubling the cube with the 2 / 270° spiral





Thank you for your attention!

Any questions?



https://github.com/CarlosLunaMota/Spira-Mirabilis