DynaMAT Icelandic material

Freyja Hreinsdóttir

June 14th 2013

http://www.dynamathmat.eu/

This project has been funded with support from the European Commission in its Lifelong Learning Programme (510028-LLP-1-2010-1-IT-COMENIUS-CMP). This publication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

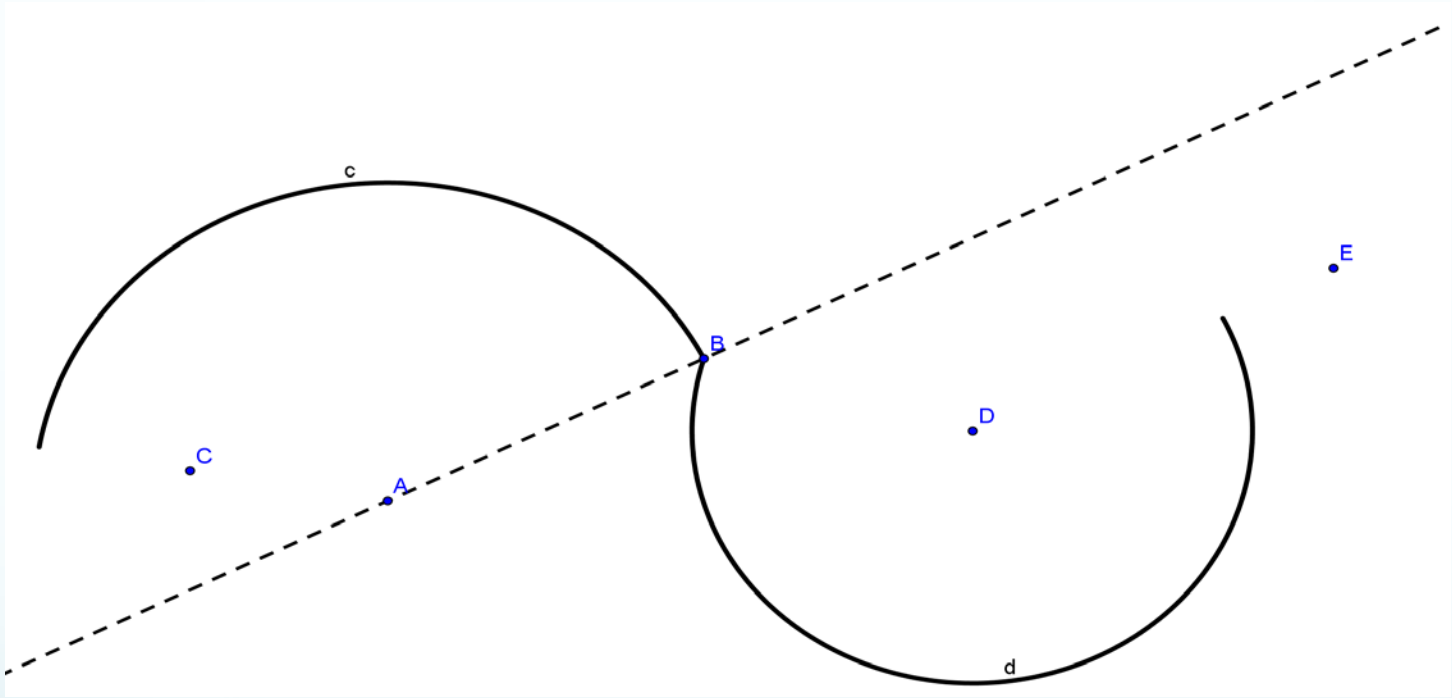
Icelandic material

- Euclidean Eggs
- Using sliders to investigate functions, tangents and integrals
- Piecewise defined functions
- Investigating 2 by 2 matrices – part I
- Investigating 2 by 2 matrices – part II

Euclidean Eggs

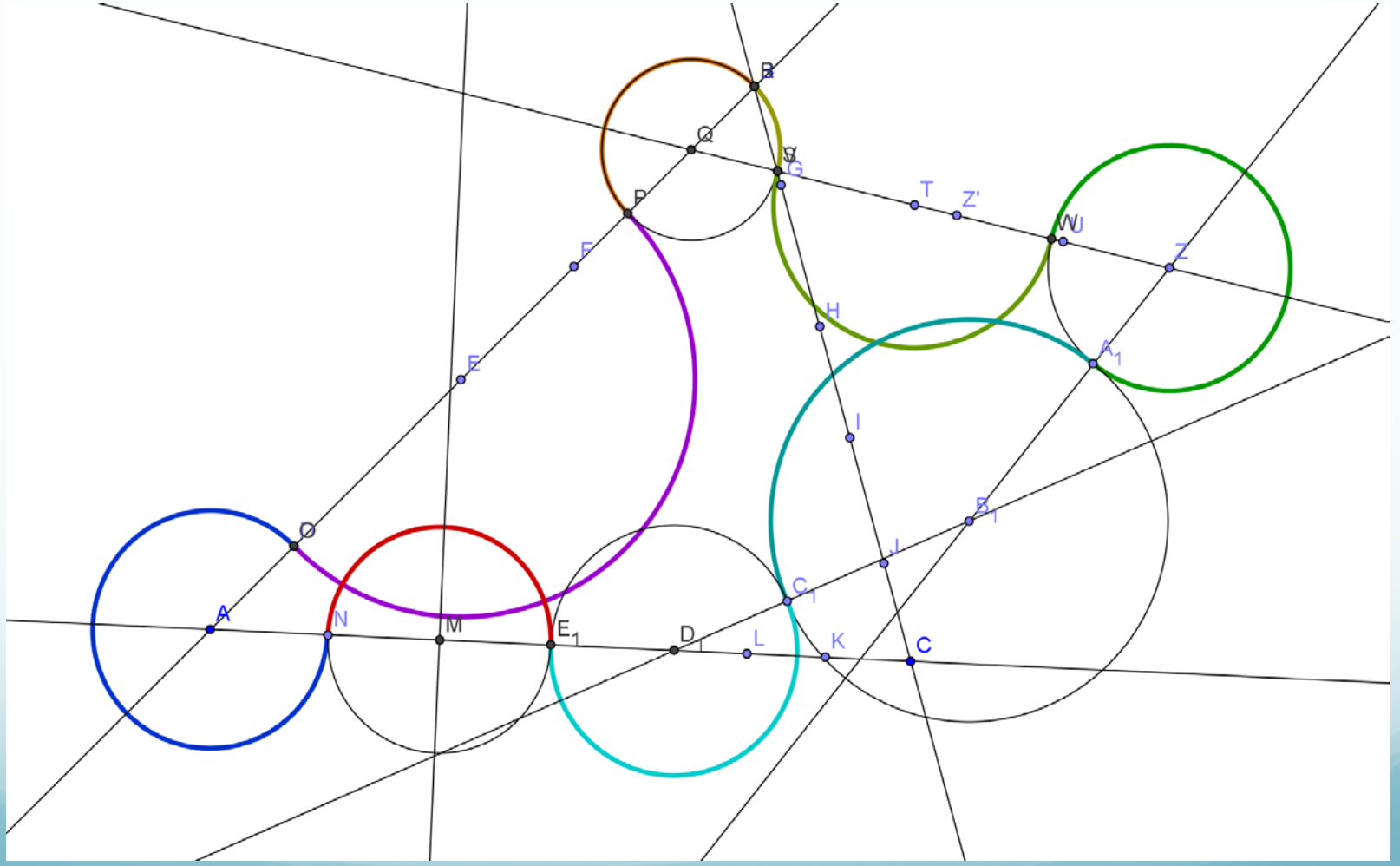
- Experiment - have fun
- Learn how to use some tools in GeoGebra
- Eggs

Principle

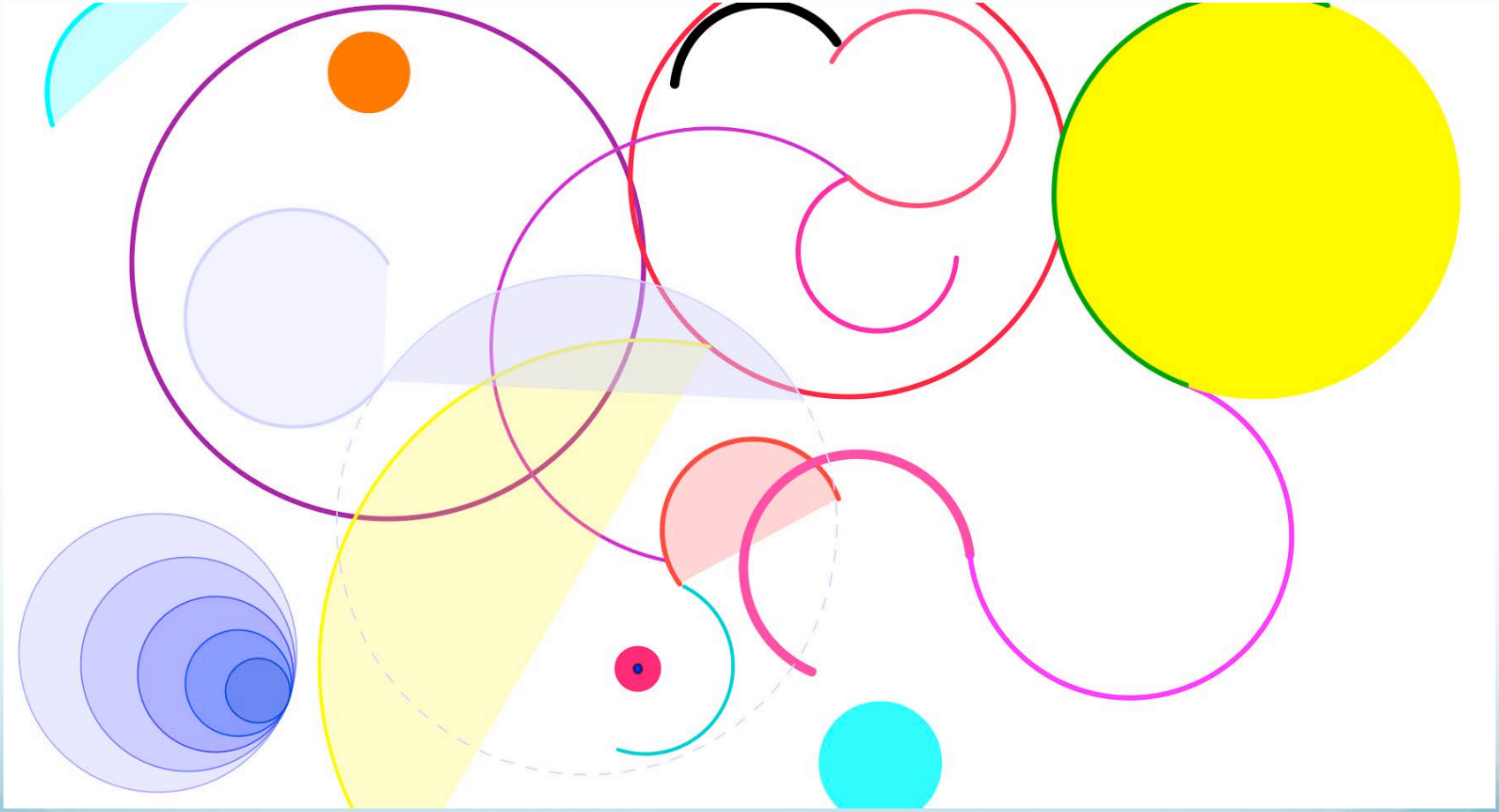


- When is the meeting of the arc smooth?
- two_arcs

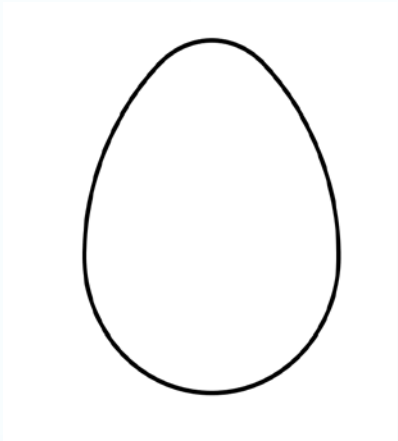
Arcs and circles



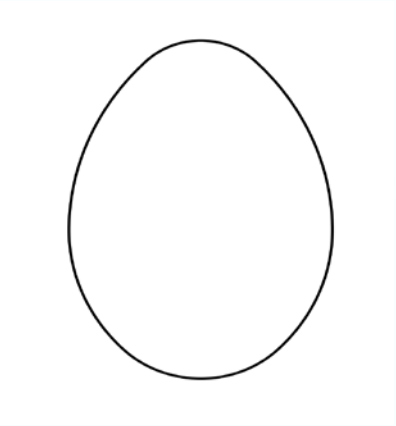
Arcs and circles



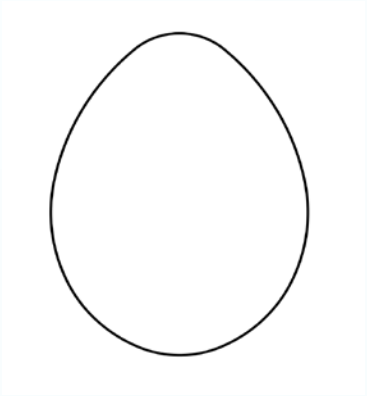
Eggs



Moss egg



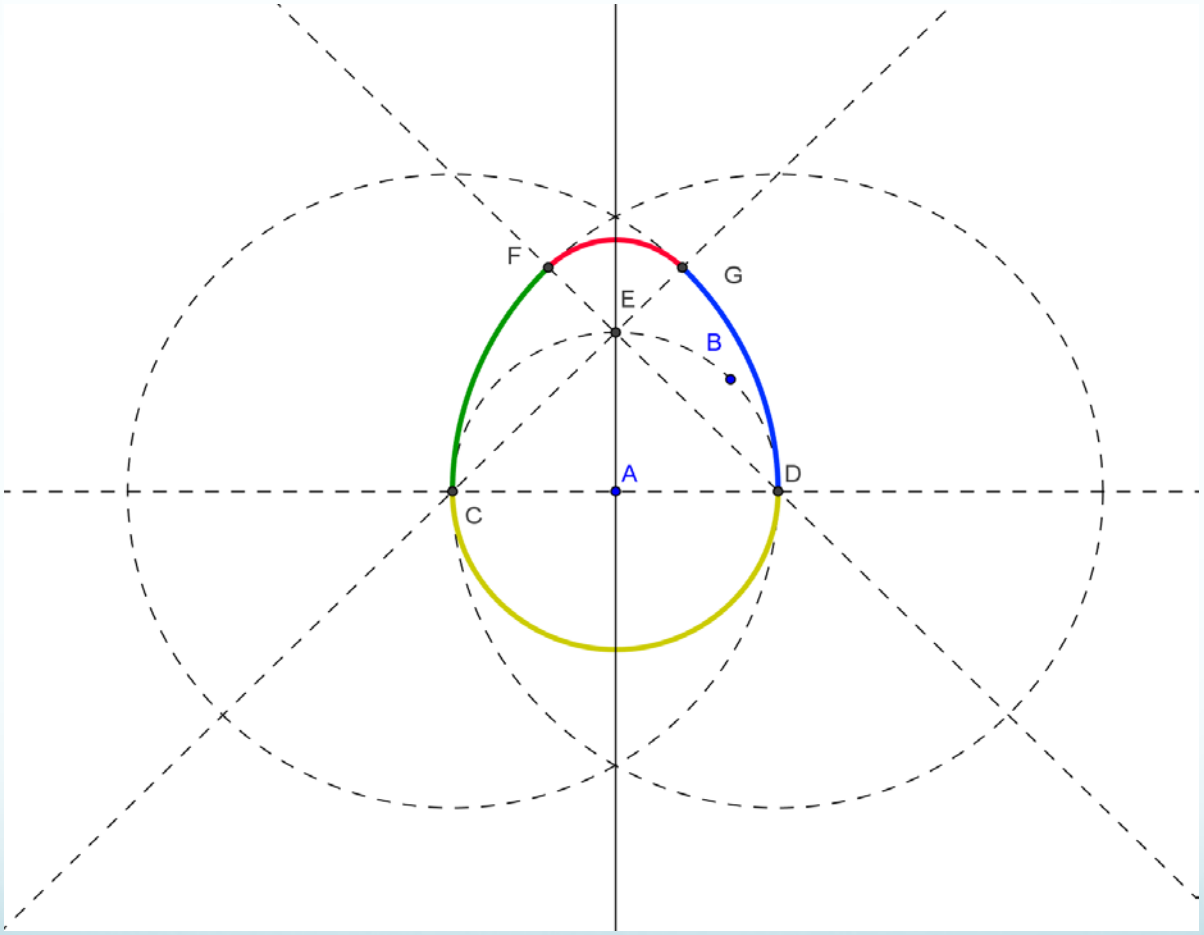
Four-point egg



Five-point egg

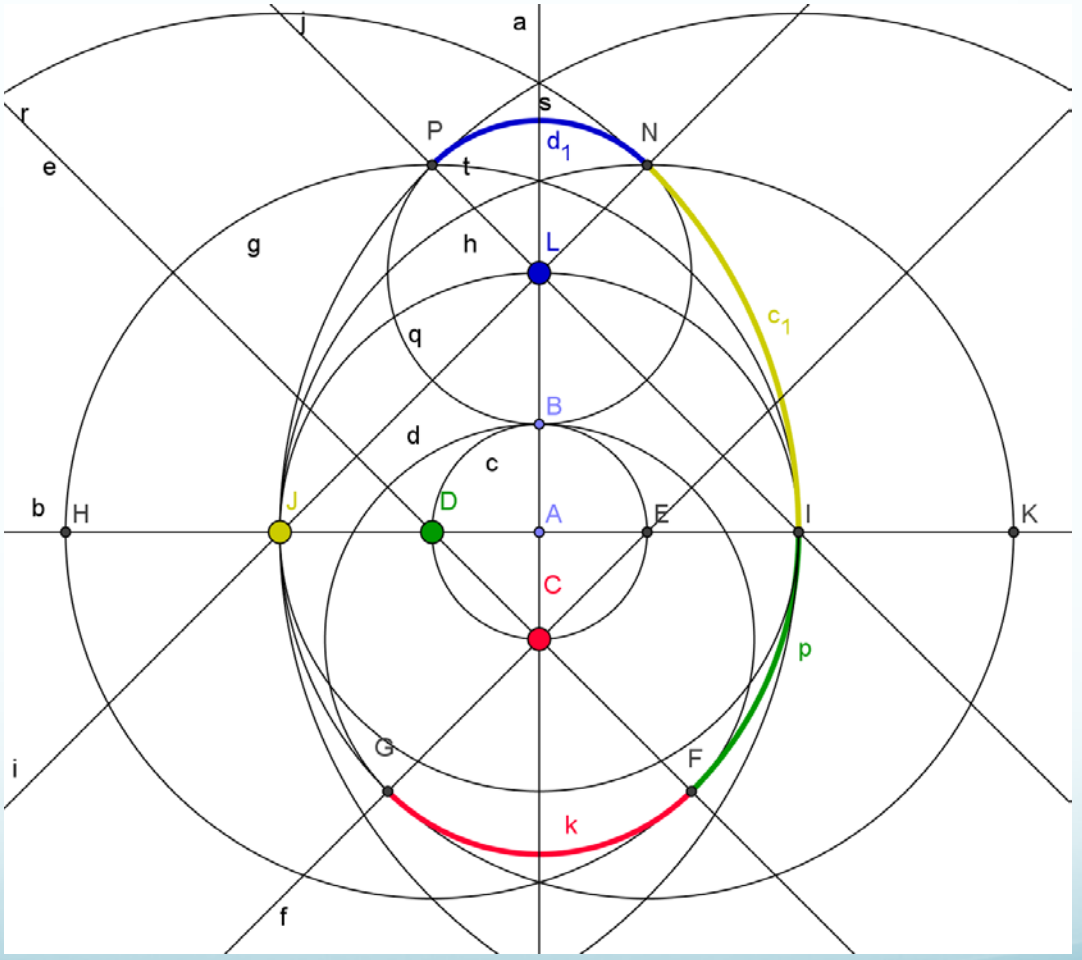
Source for Euclidean Eggs:
Dixon, R. *Mathographics*. Basic Blackwell Limited, Oxford, England, 1987

Moss egg

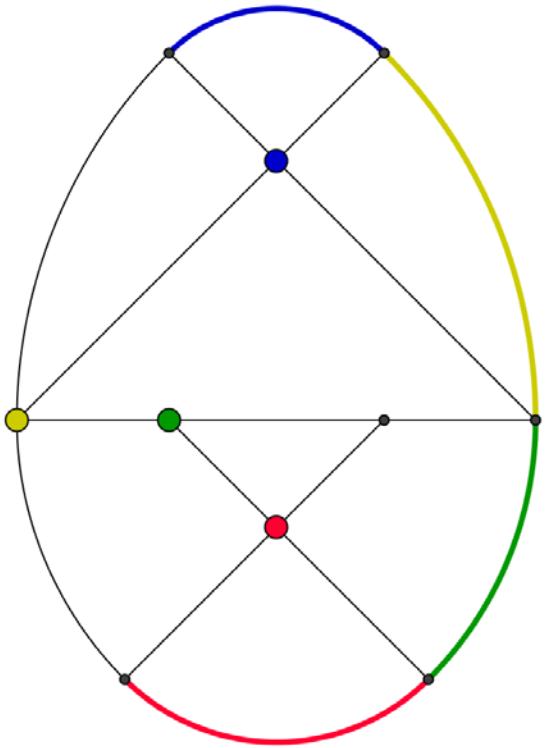


Moss egg, Variation of a Moss egg

Four-point egg



Four-point egg



GeoGebra files

- Four-point egg
- Five-point egg
- Experiment_circles
- Spiral

Chapters on linear algebra – Two graphic views

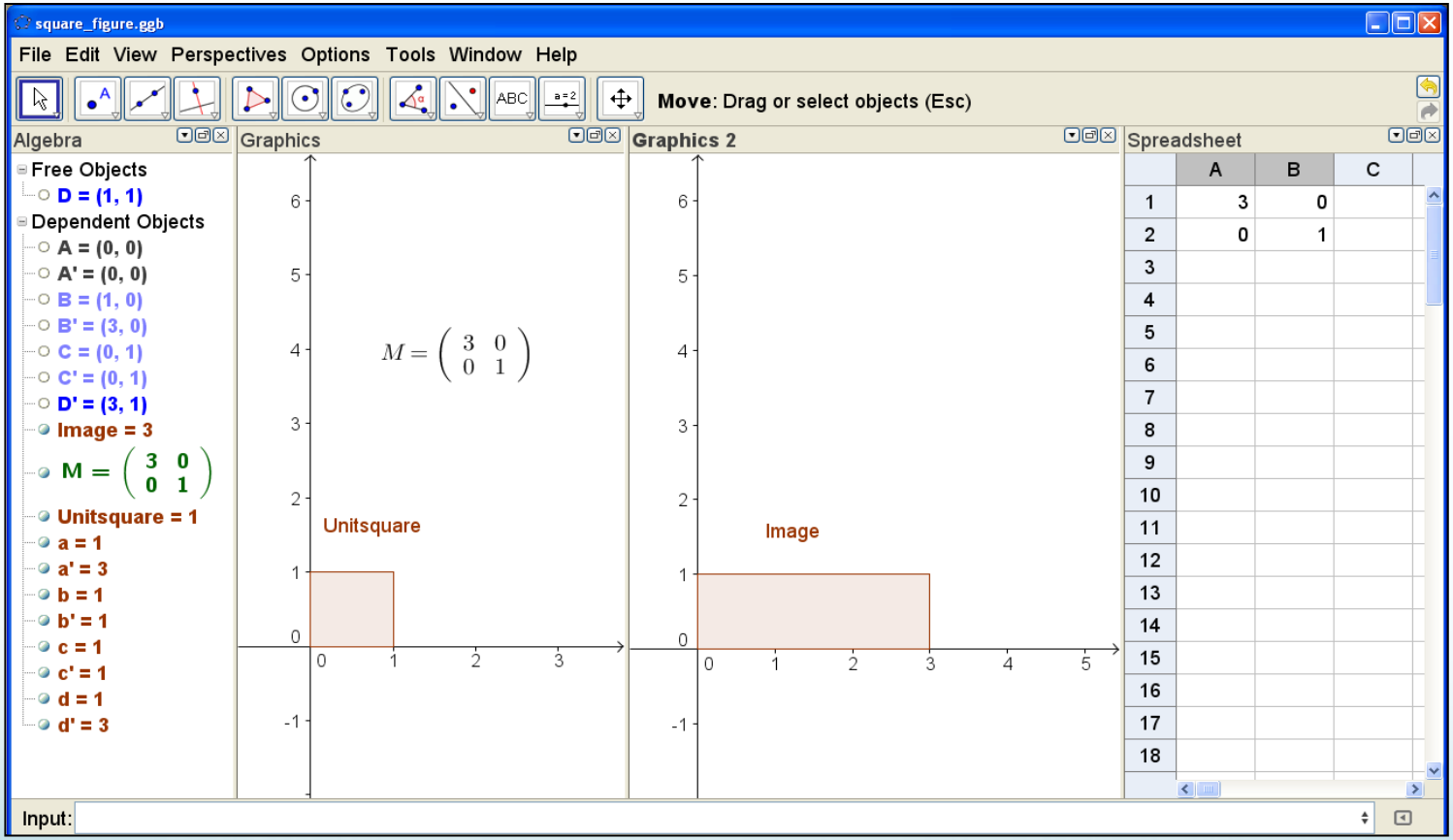
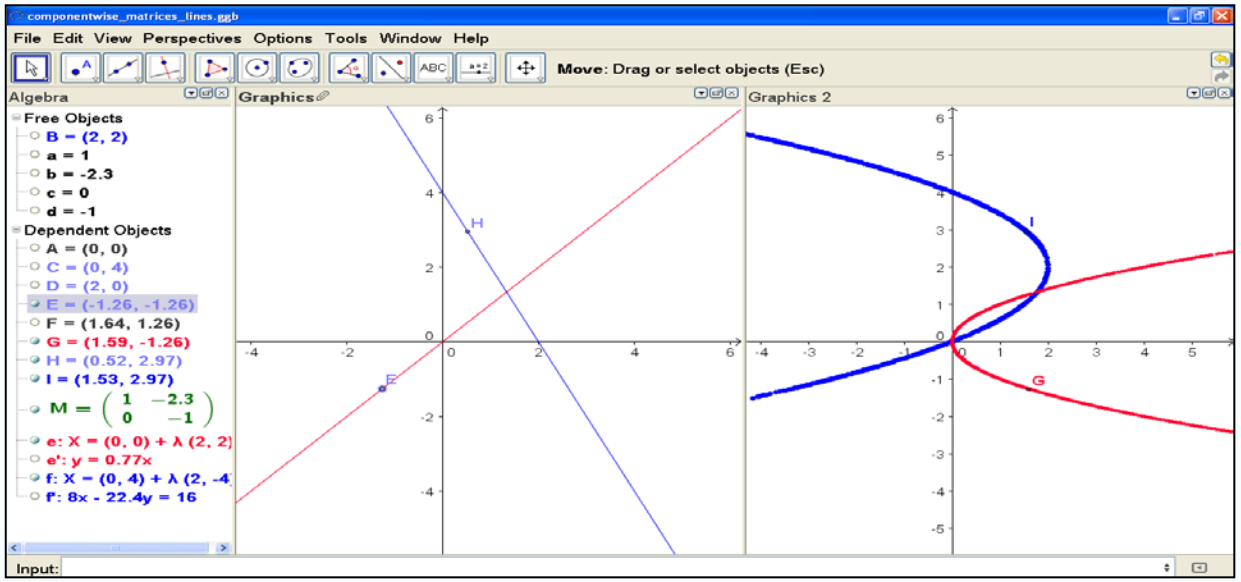


Image of the unit square

Two graphic views

- In GeoGebra 4.0 the option of having two graphic views open at the same time makes it possible to study maps from the plane to plane
- Linear maps are particularly easy to study
- There are two ways to do this:
  - defining a 2 x 2 matrix unit_square, determinant
  - defining the action on one point and using the trace option – this can also be used for nonlinear maps and complex maps

Nonlinear map



The method above can be used for *any* transformation, even non-linear ones. Say we want to study the map $(x, y) \to (x \cdot y, y)$

We define a point E on a line and then the point G = $(x(E) * y(E), y(E))$ in Graphic view 2. We then put the trace on *G* and move the point *E* along the line and watch the image trace out a curve in *Graphics 2*.

Maps from the complex numbers to the complex numbers

- We can use a similar method to study maps from C to C, e.g.

$$z \longrightarrow \frac{z+2}{z-1}$$

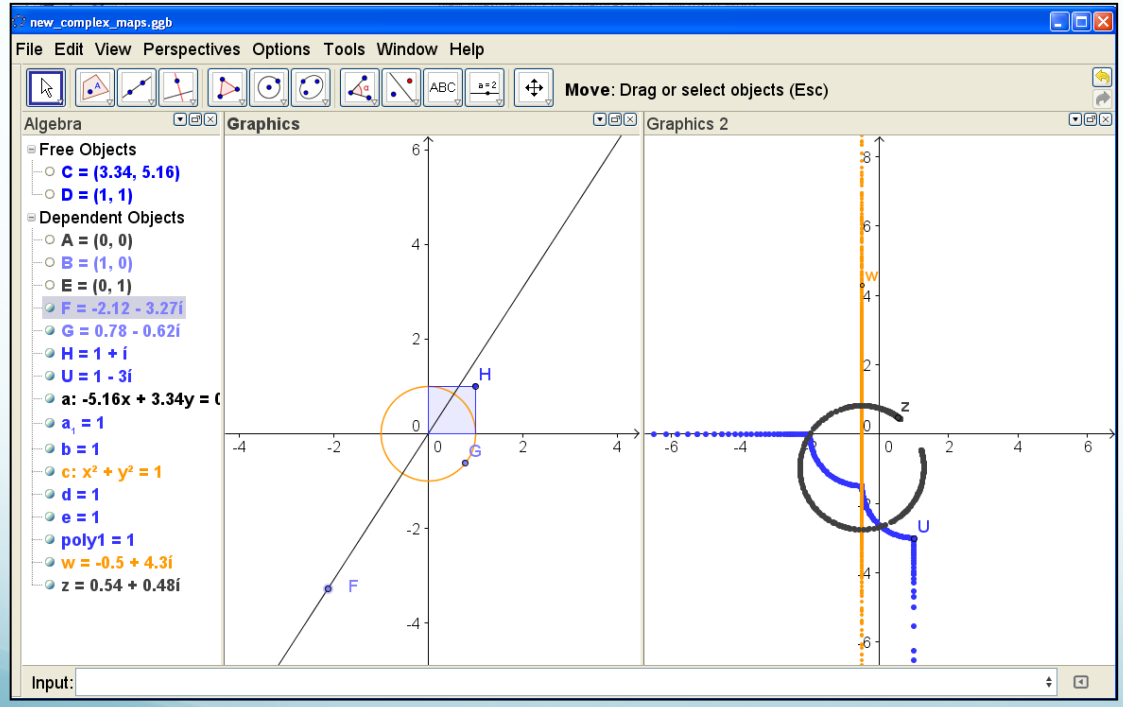


Image of a line, circle and the boundary of a square