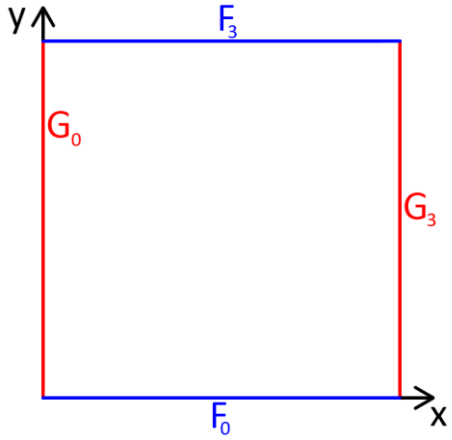
Less mathematical definition – area (magic) square

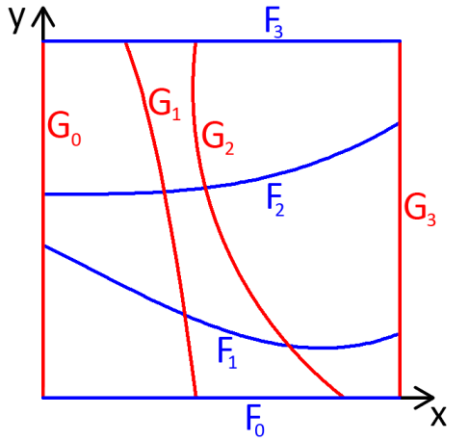
Walter Trump, 2017-02-06

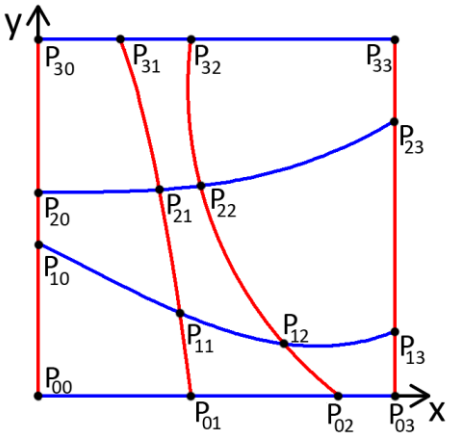
Given is a positive square matrix or a magic square of order n and
a set of 2(n + 1) continuous graphs (lines) F_0 to F_n and G_0 to G_n . (*For all examples*: n = 3)

The graphs F_0 , F_n , G_0 and G_n describe the sides of a square with the area n·S.

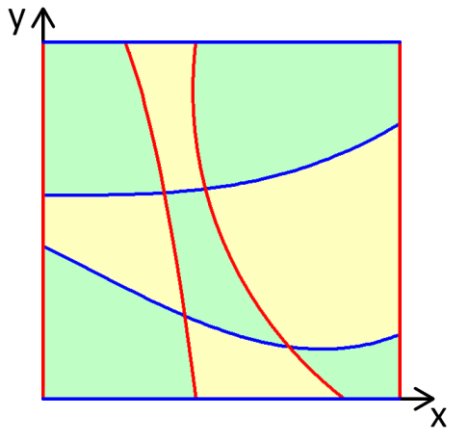


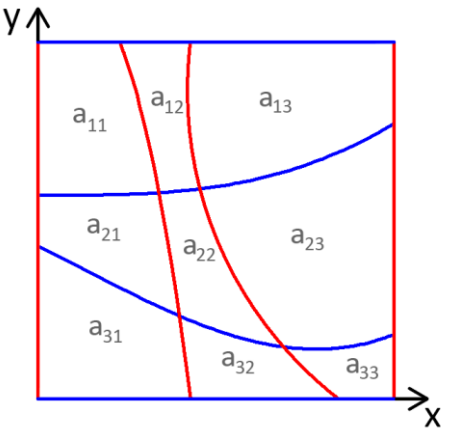
The graphs F do not intersect with each other. The graphs G do not intersect with each other.
Each graph F_i and each graph G_j intersect in exactly one Point P_{ij} .





The graphs partition the square into n² parts.
In these n² areas we write the entries of a matrix or a magic square.





This arrangement is called ***area*** (***magic***) ***square*** if the area of each part is equal the number in this part.

Definition of properties

of ***area matrices***, ***area squares*** and ***area magic squares***

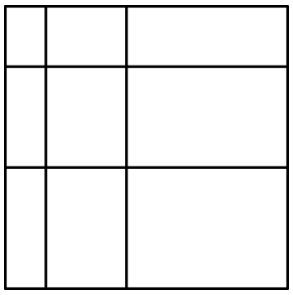
orthogonal = all graphs are parallel to a side of the square

linear = all graphs are linear (straight lines)

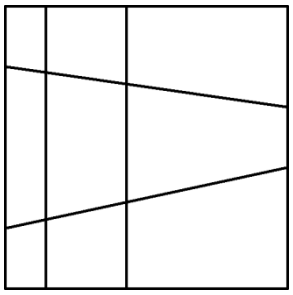
affine = all connections (between intersection points) are straight line segments

semi- ... = the graphs F or the graphs G satisfy a certain condition (*not for general use*)

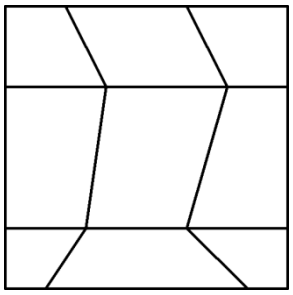
„free“ = no special property. It is not necessary to mention „free“ explicitly.



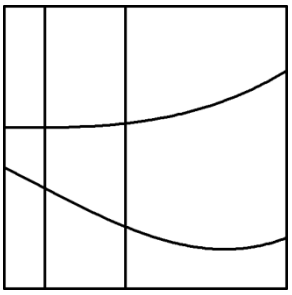
orthogonal



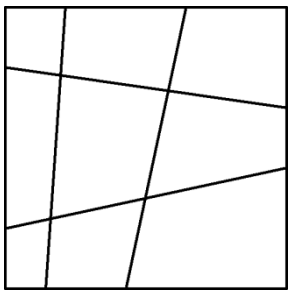
semi-orthogonal linear



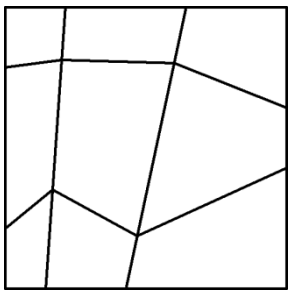
semi-orthogonal affine



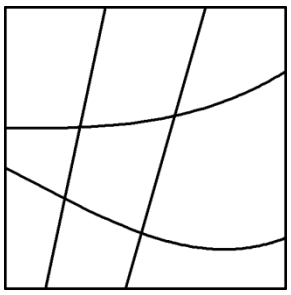
semi-orthogonal (free)



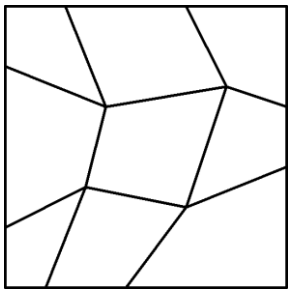
linear



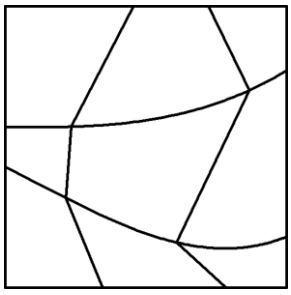
semi-linear affine



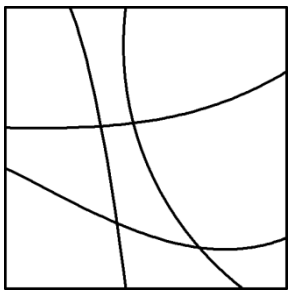
semi-linear (free)



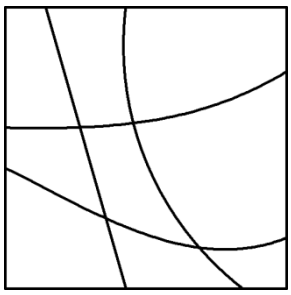
affine



semi-affine (free)

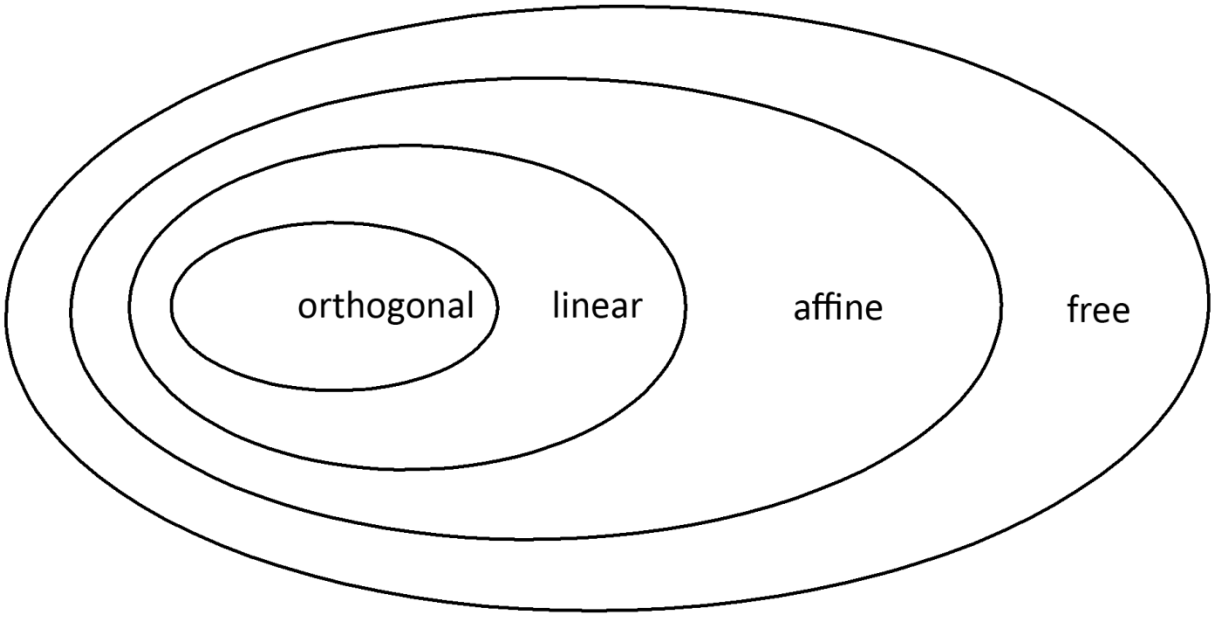


(free)



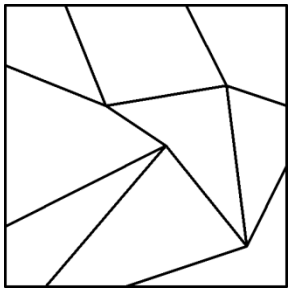
(free)

Euler diagram

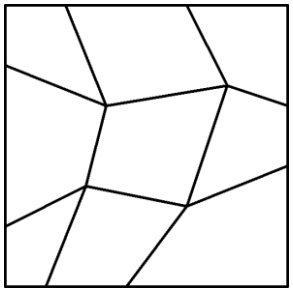


Special further properties

convex = all areas are convex, {linear} $\subset$ {convex} $\subset$ {affine}

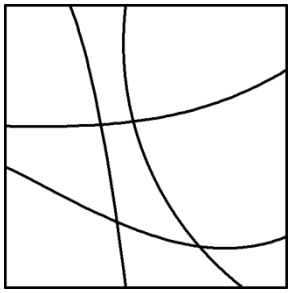


affine (but not convex)



convex

curved = no connection (between intersection points) is a straight line segments



curved