Geometric Transformation Models

Work out equations for each type of transformation:

Translation

Linear

Affine

Concept Question

Consider the following geometric properties. For each type of transformation, give a list of letters corresponding to which properties are preserved (i.e., left unchanged) by that class of transformations.

Properties:

A. Line straightness

B. Line lengths

C. Parallelism of lines

D. Angles

E. Locations of points

F. Location of the origin

Question:

- Which are preserved under translational transformations?

- Which are preserved under affine transformations?

Note: Use this online demo to gain intuition and try things out as you work through these. Affine transformations are only those where the last row remains $\begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$. Don't change the bottom row.

Projective Transformations (Homographies)

Definition and properties:

Special cases (subclasses):

Geometric interpretation: