NOTATION · CHEAT SHEET

Linear Transformation Notation at a Glance

The marks from the notation cards across the transformation pages: how each is read and what it means. Every group links to the full card on its page.

PROPERTIES

$T(c\mathbf{u} + d\mathbf{v})$

T OF C U PLUS D V
Equals $cT(\mathbf{u}) + dT(\mathbf{v})$: the test for linearity.

$T(\mathbf{0}_V) = \mathbf{0}_W$

ZERO GOES TO ZERO
The subscript says which space each zero lives in.

$\mathcal{L}(V, W)$

THE SPACE OF LINEAR MAPS
All linear maps from V to W, as a vector space.

IMAGE AND KERNEL

$T : V \to W$

T FROM V TO W
Domain before the arrow, codomain after.

$\ker(T),\ \mathrm{Im}(T)$

KERNEL AND IMAGE
For a matrix: $\mathrm{Null}(A)$ and $\mathrm{Col}(A)$.

MATRIX REPRESENTATION

$[T]_{\mathcal{C} \leftarrow \mathcal{B}}$

THE MATRIX OF T, B TO C
Column j is the image of the j-th basis vector.

$[T(\mathbf{v})]_{\mathcal{C}}$

COORDINATES OF THE IMAGE
Equal $[T]\,[\mathbf{v}]_{\mathcal{B}}$: adjacent basis letters cancel.

GEOMETRIC TRANSFORMATIONS

$R_\theta,\ S_k,\ P_W$

ROTATION, SCALING, PROJECTION
Letter for the kind of move, subscript for its size.

BA

DO A FIRST
The rightmost matrix acts first.

CHANGE OF BASIS

$A' = P^{-1}AP$

A PRIME
Same map, another basis; the prime is not a derivative.

$T : V \to V$

T FROM V TO ITSELF
One space at both ends, so one basis serves both.

$A \sim B$

A IS SIMILAR TO B
Some P gives $B = P^{-1}AP$.

SAME MARKS, DIFFERENT JOB

$\to$ vs $\mapsto$	Between spaces, the plain arrow; for a single vector, the barred one.
A'	The same map in a new basis, not a derivative or a transpose.
BA	Written left to right, applied right to left.