

Differential Geometry; Chapter II Study Guide

The following is a *brief* list of topics covered in Chapter II, “Affine Spaces,” of Dodson and Poston’s *Tensor Geometry*, 2nd edition. This list is not meant to be comprehensive, but only gives a list of several important topics.

II.1. Spaces.

Affine space/points/difference function (Definition II.1.01), $X = \mathbb{R}^n$ as an example of an affine space, “directed distance” interpretation (Note II.1.A), the tangent space to an affine space as a vector space (Definition II.1.02), tangent vector and free vectors, freeing map, binding map, affine subspace (of flat), hyperplane/affine hyperplane, natural affine structure on a vector space, affine hull of a set $H(S)$, translate of an affine subspace, parallel affine subspaces, necessary and sufficient conditions for parallel affine subspaces (Lemma II.1.05), dimension of an affine space, chart (or choice of coordinates), change of coordinates.

II.2. Combinations of Points.

“Midpoint,” affine combination of two points, affine combination of several points, affine hull as an affine combination, affine convex hull

II.3. Maps.

Affine map, affine map on convex sets, linear part of an affine map (Definition II.3.02), affine isomorphism, affine automorphism, translation, rank and nullity of an affine map, coordinates.