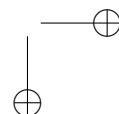
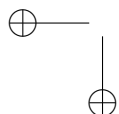


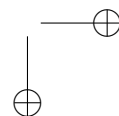
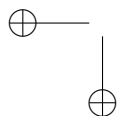
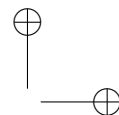
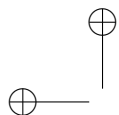
The Elements of Linear Algebra

Volume One: Livre des Lignes Droites

Theron J Hitchman

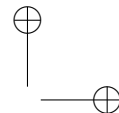
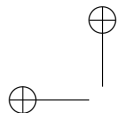
Fall 2017



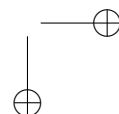
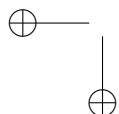


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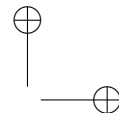
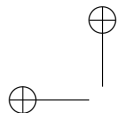
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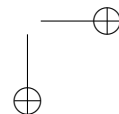
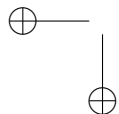
The Equation of a Line in the Plane

Outline

- points vs physics vectors vs math vectors
- the idea of \mathbb{R}^2
- sketching points and vectors in the plane
- vector algebra in \mathbb{R}^2
- lines in \mathbb{R}^2 as parametric objects: through the origin, and not
- sketching lines in \mathbb{R}^2
- lengths, angles, and the dot product in \mathbb{R}^2
- normal vector to a line in \mathbb{R}^2
- equation of a line, three methods: elimination, from two pts via similar triangles, from geometry of dot product
- families of parallel lines
- sketching a line from an equation
- the big theorem with duality



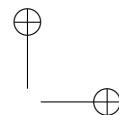
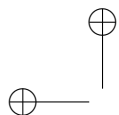
THE EQUATION OF A LINE IN THE PLANE



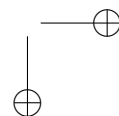
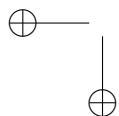
The Equations of a Line in Space

Outline

- points, vectors in space
- \mathbb{R}^3
- vector algebra
- planes in \mathbb{R}^3 parametrically: through the origin, not
- dot product in \mathbb{R}^3
- normal vector to a plane
- the equation of a plane: by elimination, by dot product
- families of parallel planes
- sketching from an equation
- big theorem with duality for planes
- LINES in \mathbb{R}^3 as intersection of two planes



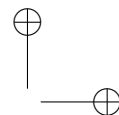
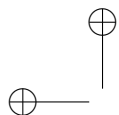
THE EQUATIONS OF A LINE IN SPACE



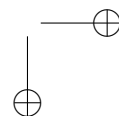
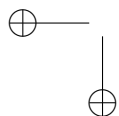
Systems of Lines in the Plane

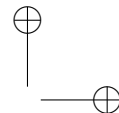
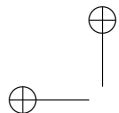
Outline

- note about how we understand one line in the plane, what about two?
- idea of three possible outcomes
- translations into matrix algebra equation: matrix-vector multiplication
- idea of a solution to a system
- questions: how can we characterize the three options in terms of the matrix
- use normals to answer, linear independence...
- characterization of column space bit??
- write “solution” as parametric form of the line, or as just point
- algorithmic solution stuff



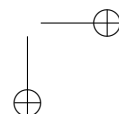
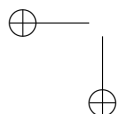
SYSTEMS OF LINES IN THE PLANE

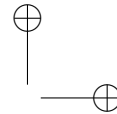
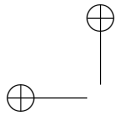




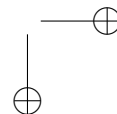
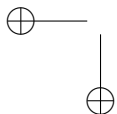
Systems of Planes in Space

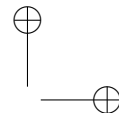
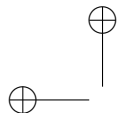
- Outline**
- to-do



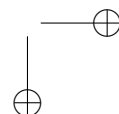
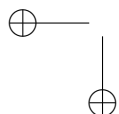


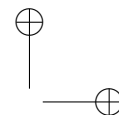
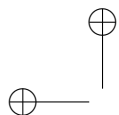
SYSTEMS OF PLANES IN SPACE



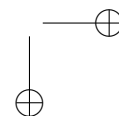
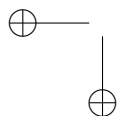


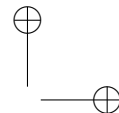
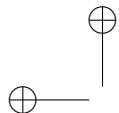
The Algebra of Square Matrices



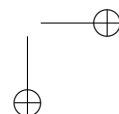
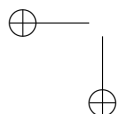


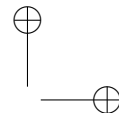
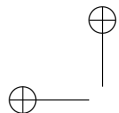
THE ALGEBRA OF SQUARE MATRICES



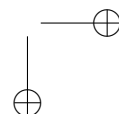
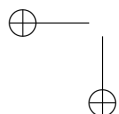


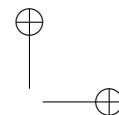
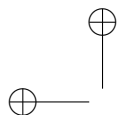
Approximate Solutions to Unsolvable Systems





APPROXIMATE SOLUTIONS TO UNSOLVABLE SYSTEMS





Matrices as Transformations

