

LINEAR ALGEBRA II FOR PHYSICS

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PROGRAM

- (1) Inner Products.
 - (a) The dot product.
 - (b) Inner product spaces.
 - (c) The norm.
 - (d) Square-integrable continuous functions and square-summable sequences.
 - (e) Orthogonality: the orthogonal projection; the Gram–Schmidt process; orthogonal complements. Sylvester’s criterion.
 - (f) Orthogonal operators: isometries; the orthogonal groups; symmetric and skew-symmetric operators.
- (2) Hermitian products.
 - (a) The standard hermitian product on \mathbb{C}^n .
 - (b) Hermitian spaces. In particular: nondegeneracy and Dirac’s notation; the adjoint of an operator.
 - (c) The norm.
 - (d) Orthogonality: the orthogonal projection; the Gram–Schmidt process; orthogonal complements. Sylvester’s criterion.
 - (e) Unitary operators: the unitary groups; self-adjoint and anti-self-adjoint operators.
 - (f) Diagonalization of normal matrices; in particular, unitary, self-adjoint, real symmetric matrices.
 - (g) Simultaneous diagonalization.
 - (h) Normal form of orthogonal matrices.
 - (i) Properties of the exponential map to unitary and to orthogonal matrices.
 - (j) Normal form of real symmetric and of real skew-symmetric bilinear forms.