

MATH 3170 EXAM 1 REVIEW

EXAM 1 WILL BE ON MONDAY, 2/9/09

★ Bring something to write with to the exam. Note that calculators and scratch paper will not be allowed.

Introduction and Chapter 1 We began this semester with a discussion of set theory, the common number systems, and the definitions of congruence, group, abelian/nonabelian, subgroup, field, subfield, and characteristic. We proved the two-step subgroup test and the subfield test, which describe the properties that are sufficient for determining whether or not sets are subgroups or subfields of the groups or fields in which they reside. Many examples were discussed.

Section 2.1 We defined vector space and linear combination and looked at several examples.

Section 2.2 We defined subspace, Hermitian matrices, span, and the sum of subsets of a vector space. We proved that if W is a nonempty subset of a vector space V over F that is closed under the operations of addition and scalar multiplication on V , then W is a subspace. From this theorem, we showed that the intersection and sum of any list of subspaces is also a subspace.

Section 2.3 Definitions included linearly dependent/independent, basis, dimension, finite-dimensional, and the standard basis for F^n . We proved that the vector space of polynomials over a subfield of \mathbb{C} is infinite-dimensional and that if W_1 and W_2 are two subspaces of a vector space V over F , then

$$\dim_F(W_1) + \dim_F(W_2) = \dim_F(W_1 \cap W_2) + \dim_F(W_1 + W_2).$$

It is recommended that you review bases by reading over the main theorems in this section.

Section 2.4 Be able to find the coordinate vector of a given vector relative to a basis.

Other In addition to the topics listed above, you should be able to work problems similar to the examples covered in class and the assigned homework problems listed on the back of this page.

ASSIGNED HOMEWORK PROBLEMS

Section 1.2 # 1, 2, 5, 7

Section 2.1 # 1, 3-5, 7

Section 2.2 # 1, 2, 4, 6, 9

Section 2.3 # 1-7, 9

Section 2.4 # 1-4