

2.035: Midterm Exam - Part 1 (In-class) Spring 2007

1.5 hours

You may use the notes you took in class and any other handwritten notes in your own handwriting. No other sources should be used.

Problem 1: Explain each of the following concepts precisely (yet succinctly):

- a) a vector space;
- b) a set of linearly independent vectors;
- c) the dimension of a vector space;
- d) a basis for a vector space;
- e) the components of a vector in a basis;
- f) the scalar or inner product between two vectors;
- g) the distance between two vectors;
- h) an orthonormal basis;
- i) a linear transformation on a vector space;
- j) an invariant subspace of a linear transformation;
- k) the null space of a linear transformation;
- ℓ) a singular linear transformation;
- m) the components of a linear transformation in a basis; and
- n) the scalar invariants of a linear transformation.

Problem 2: Give an example illustrating each concept in Problem 1.