

Math 22 Lin Alg: Homework 3

due Wed Jul 12 . . . but best if do relevant questions after each lecture

Required problems from David Lay book: (remember to show your working/reasoning—answers without explanation will not receive a high score!) You may want to warm up with the practise problems, or odd problems nearest the assigned ones.

1.8: Goals: Know the properties of a linear transformation; recognize geometric properties of some linear transformations.

21, 24 [this is one of your first proofs: use the defining properties of linear transformations in conjunction with information from the question to prove the final sentence], 30 [another proof—please try to explain clearly but briefly].

1.9: Goals: Produce a matrix equation for a given linear transformation; understand one-to-one and onto transformations and their relationship with the number of solutions.

2, 8 [hint: follow what happens to the unit vectors], 22, 32, 35 [hint: use results of questions 31, 32].

1.10: (last 2 pp only) Goals: Be able to convert a problem described in words into a linear difference equation, and use it to compute a couple of iterations forward in time.

10.

A. Suppose each year 10% moves from city to suburbs (90% stays in city) and 20% moves from suburbs to city (80% stays in suburbs). Set up the migration matrix. In 2001 the populations were 500,000 in the city and 500,000 in the suburbs. What were the populations in the *previous* year? [Hint: work in millions, *i.e.* use 0.5 instead of 500,000, etc. Also multiply your augmented matrix by a convenient factor]

2.1: Goals: Know how to multiply matrices (when the product is defined), properties of matrix multiplication, and the transpose of a matrix.

2, 16, 17, 25, 33 [trickier one—try and use as simple notation as possible].

2.2: Goals: Know how to solve a system of linear equations using the inverse of a matrix, understand the relationship between row operations and elementary matrices, be able to compute the inverse of a matrix (learn the formula for the inverse of a 2-by-2 matrix).

7, 9 [read carefully!]