UNIVERSITY
OF MIAMI

Dr. Bruno Benedetti
Department of Mathematics
Ungar Building, Office 533
Office hours: Tue 13:15–14:15, Thu 13:15–14:15
(or by appointment: `bruno@math.miami.edu`)

Linear Algebra: Homework Problems

Math 210O– Fall 2015

Homework 1 (due Sept. 10, 2015)
Section 1.1: ex. 6. Section 1.2: ex. 6, 25, 40, 41. Section 1.3: ex. 4, 20, 30.

Homework 2 (due Sept. 17, 2015)

1. Let $A = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$. Is there a square matrix B such that $AB = 0$? (Justify your answer.)
2. Perform Gauss–Jordan elimination on the matrix $C = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 0 & 0 \\ 0 & 5 & 6 \end{pmatrix}$, and represent C as a product of elementary matrices and a matrix in reduced row echelon form. Is C invertible?
3. Find a 2×2 matrix D without zero entries such that $D^2 = 0$. Is there a matrix E such that DE is the identity? (Justify your answer.)
4. Find the inverse of the matrix $F = \begin{pmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{pmatrix}$, where a, b, c are positive integers.

Homework 3 (due Sept. 24, 2015)
Section 1.4: ex. 34, 46, True/false: b, h, j, k. Section 1.5: ex. 1, 19. Section 2.1: ex. 38. Section 2.3: ex. 5, 6.

Homework 4 (due Oct. 1, 2015)
Section 1.2: ex 3a. Can you write such matrix as a product of elementary matrices? (Justify your answer). Section 1.4: ex. 36,40. Section 2, supplementary (page 129): ex. 15. Section 3.1, True/false: d, e, g, h. Section 3.3: ex. 1.

Homework 5 (due Oct 8, 2015 via email to m.weiss@math.miami.edu, or Oct. 6, 2015 hand-in)
Section 3.2 True/False: a, d, g, h, j. Section 3.3: ex. 28, 31. Chapter 3 Supplementary: ex. 13

Homework 6 (due Oct 29, 2015)
Section 4.2: ex. 1, 3, True/False: g, h, i, j, k. Section 4.3: ex. 6, 10, 12. Section 4.4: ex. 7.

Homework 7 (due Nov 5, 2015)
Section 4.5: ex. 9, 13, 17. Section 4.6: ex. 1, true/false: a, b, c, d, e; ex. 20 (harder). Section 4.8: ex. 15.

Homework 8 (due Nov 12, 2015)
Section 5.1: ex. 13, 33, 34, 39. Section 5.2: ex. 1. Additional exercises: Diagonalize the matrix $Z = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$.

Prove that similarity of matrices is an equivalence relation [Sketch: (i) Prove that any matrix A is similar to itself; (ii) Prove that if A is similar to B, then B is similar to A; (iii) Prove that if A is similar to B and B is similar to C, then A is similar to C.]

Remember: Second test is on November 17, 2015.