

Read Hoffman and Kunze, Chapter 1.

1. From Hoffman and Kunze, do these problems:

Page 10, #2; page 11, #3; page 15, #1; p.16 #6,7.

2. (a) Let  $A$  be a square matrix satisfying  $A^2 - 2A - I = 0$ . Show that  $A$  is invertible, and find a formula for  $A^{-1}$  in terms of  $A$ . [Hint: By *inspection*, find a matrix  $B$  such that  $AB = BA = I$ .]

(b) Let  $B$  be a square matrix satisfying  $B^5 = 0$ . Show that  $B$  is not invertible, but that  $I - B$  is invertible, and find a formula for  $(I - B)^{-1}$  in terms of  $B$ . [Hint:  $1/(1 - x) = 1 + x + x^2 + x^3 + \dots$ .]

3. Let  $A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 0 & 1 & c \end{pmatrix}$ , where  $c$  is a real number.

a) Find  $A^{-1}$  using row reduction.

b) *Using* part (a), determine for which real numbers  $c$  there is no inverse for  $A$ .