1.2: 7.b. Impossible

7.c. $\begin{bmatrix} 3 & 6 & 0 \\ -1 & 4 & 2 \end{bmatrix}$

34.b.i. $\begin{bmatrix} -2 & 1 \\ 3 & 2 \end{bmatrix}\begin{bmatrix} 1 & -2 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} -2 \\ 3 \end{bmatrix}\begin{bmatrix} 1 & -2 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \end{bmatrix}\begin{bmatrix} 1 & 0 \end{bmatrix}$

$= \begin{bmatrix} -2 & 4 \\ 3 & -6 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 2 & 0 \end{bmatrix} = \boxed{\begin{bmatrix} -1 & 4 \\ 5 & -6 \end{bmatrix}}$

1.3: 14. b. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}.$

$\begin{bmatrix} a^2+bc & ab+bd \\ ac+cd & bc+d^2 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

$b = ab+bd \to b(1-a-d) = 0$

$c = ac+cd \Rightarrow c(1-a-d) = 0$

Unless b and c are both 0 as in the four examples above, $d = 1-a$

all matricies of the form

$\begin{bmatrix} x & y \\ \frac{x-x^2}{y} & 1-x \end{bmatrix}$

15. c. Subtracts 3·row #3 from row #2 (3x3 matrix)

d. Adds ½·row #1 to row #3 (3x3 matrix)

33. b. $\begin{bmatrix} -1 & 1 & 1 \\ 1 & 1 & 1 \\ -1 & 1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}\begin{bmatrix} -1 & 1 & 1 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

b_1. (forward)

$x_1 = 1$

$-(1) + x_2 = -1 \quad x_2 = 0$

$(1) + x_3 = 1 \quad x_3 = 0$

b_2 (backward).

$3x_3 = 2 \quad x_3 = 2/3$

$2x_2 = 0 \quad x_2 = 0$

$-x_1 + (0) + (2/3) = 3. \quad x_1 = -7/3$

Homework 1

Alex Ojemann

1.1: 1.b. $\left[\begin{array}{cc|c} 6 & 1 & 5 \\ 3 & -2 & 5 \end{array}\right] -\tfrac{1}{2}r_1$

$\left[\begin{array}{cc|c} 6 & 1 & 5 \\ 0 & -5/2 & 5/2 \end{array}\right]$

$-5v/2 = 5/2 \quad v = -1$

$6u + (-1) = 5 \quad 6u = 6 \quad u = 1$

$\boxed{u = 1 \quad v = 1}$

2. $\begin{array}{c} \begin{array}{ccc} a & b & c \end{array} \\ \left[\begin{array}{ccc|c} 1 & 2 & -1 & 3 \\ 1 & 0 & -1 & 3 \\ 0 & 2 & 1 & 1 \end{array}\right] \end{array} -r_2$

$\left[\begin{array}{ccc|c} 0 & 2 & 0 & 0 \\ 1 & 0 & -1 & 3 \\ 0 & 2 & 1 & 1 \end{array}\right]$

$2b = 0 \quad b = 0$

$2(0) + c = 1 \quad c = 1$

$a - (1) = 3$

$a = 4$

$\boxed{a = 4 \quad b = 0 \quad c = 1}$

1.2: 4.g. $A = \begin{bmatrix} 3 & 1 & 0 & 0 \\ 1 & 3 & 1 & 0 \\ 0 & 1 & 3 & 1 \\ 0 & 0 & 1 & 3 \end{bmatrix} \quad \vec{x} = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} \quad b = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$

5.a. $\left[\begin{array}{cc|c} 1 & -1 & -1 \\ 2 & 3 & -3 \end{array}\right] -2r_1$

$\left[\begin{array}{cc|c} 1 & -1 & -1 \\ 0 & 5 & -1 \end{array}\right]$

$5y = -1 \quad y = -1/5$

$x - (-1/5) = -1 \quad x = -6/5$

$\boxed{x = -6/5 \quad y = -1/5}$