

1.1 These questions cover the old material from Wed Jan 15. You may recognize the following two questions as part of HW1.1#9, and as HW1.1#5, 29, and 31 "with numbers changed."

1.1.1 Describe the row operations to transform this matrix into reduced (row) echelon form. You don't need to do them, just describe them clearly.

$$\begin{bmatrix} 1 & -1 & 0 & 9 & -5 \\ 0 & 1 & -2 & 0 & 7 \\ 0 & 0 & 1 & -3 & 2 \\ 0 & 0 & 0 & 1 & 4 \end{bmatrix} \quad \begin{array}{l} \text{new } R_3 = \text{old } R_3 + 3R_4 \quad (\text{gives } 0 \ 0 \ 1 \ 0 \ 14) \\ \text{new } R_2 = \text{old } R_2 + 2R_3 \quad \leftarrow (\text{the new one } \uparrow) \\ \text{new } R_1 = \text{old } R_1 + 1R_2 \quad \leftarrow (\text{the new one } 0 \ 1 \ 0 \ 0 \ 21) \end{array}$$

1.1.2 Describe the solution set of the system of equations that has the following augmented matrix. The variables are $x_1, x_2, x_3,$ and x_4 . This pattern is used pretty consistently throughout the book.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 16 \\ 0 & 1 & 0 & 0 & 21 \\ 0 & 0 & 1 & 0 & 14 \\ 0 & 0 & 0 & 1 & 4 \end{bmatrix} \quad \begin{array}{l} 1x_1 + 0 + 0 + 0 = 16 \\ 0 + 1x_2 + 0 + 0 = 21 \\ 0 + 0 + x_3 + 0 = 14 \\ 0 + 0 + 0 + x_4 = 4 \end{array} \quad \begin{array}{l} \text{solution is} \\ (x_1 = 16, x_2 = 21, x_3 = 14, x_4 = 4) \\ \text{or } (16, 21, 14, 4) \text{ for short.} \end{array}$$

1.2 These are questions over today's material.

1.2.1 Find the general solution to the linear system whose augmented matrix is given below. Make sure to answer in complete sentences. "x=4" is a complete sentence (it is read, "x is 4," and while not very poetic, it does contain the essential features of the complete sentence).

$$\begin{array}{c} x_1 \quad x_2 \quad x_3 \quad \# \\ \left[\begin{array}{ccc|c} 1 & 0 & -2 & 9 \\ 0 & 1 & 3 & 5 \end{array} \right] \end{array} \quad \begin{array}{l} x_1 - 2x_3 = 9 \quad \text{so} \quad x_1 = 9 + 2x_3 \\ x_2 + 3x_3 = 5 \quad \quad \quad x_2 = 5 - 3x_3 \end{array} \quad \begin{cases} x_1 = 9 + 2x_3 \\ x_2 = 5 - 3x_3 \\ x_3 \text{ is FREE} \end{cases}$$

1.2.2 "Just give me some numbers!!!" For the same matrix, give specific numeric values for variables that do actually work (even if there might be other answers).

$$\begin{array}{c} x_3 \text{ can be anything} \\ \left[\begin{array}{ccc|c} 1 & 0 & -2 & 9 \\ 0 & 1 & 3 & 5 \end{array} \right] \quad \text{Just choose a \# for } x_3 \end{array} \quad \begin{cases} x_1 = 13 \\ x_2 = -1 \\ x_3 = 2 \end{cases}$$

if $x_3 = 0$, $(x_1 = 9, x_2 = 5, x_3 = 0)$
 if $x_3 = 1$, $(x_1 = 11, x_2 = 2, x_3 = 1)$

You should get this back on Wed Jan 22. The following note is for you to read then:

Before next class (Fri Jan 24) (a) reread 1.3 and fix your notes, (b) read 1.3 and get your notes ready for next class, and (c) do HW1.2 #1, 3, 5, 7, 9, 13, 15, 21, 23, 25, 27.