Sect 1.1
answer key

3. $\begin{cases} x_1 + 5x_2 = 7 \\ x_1 - 2x_2 = -2 \end{cases}$

$(x_1, x_2) = (4/7, 9/7)$

8. $\begin{bmatrix} 1 & -4 & 9 & 0 \\ 0 & 1 & 7 & 0 \\ 0 & 0 & 2 & 0 \end{bmatrix}$ $R_3 \leftrightarrow \frac{1}{2}R_3$

$\begin{bmatrix} 1 & -4 & 9 & 0 \\ 0 & 1 & 7 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$ $R_1 \leftrightarrow R_1 + 4R_2$, $R_2 \leftrightarrow R_2 - 7R_3$

$\begin{bmatrix} 1 & 0 & 37 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \rightsquigarrow \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$

$\Rightarrow \begin{cases} x_1 = 0 \\ x_2 = 0 \\ x_3 = 0 \end{cases}$

7. $\begin{bmatrix} 1 & 7 & 3 & -4 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix}$ $R_1 \leftrightarrow R_1 - 7R_2$, $R_2 \leftrightarrow R_2 + R_4$, $R_3 \leftrightarrow R_4$

$\begin{bmatrix} 1 & 0 & -4 & -25 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ no possible solution set

12. $\begin{cases} x_1 - 3x_2 + 4x_3 = -4 \\ 3x_1 - 7x_2 + 7x_3 = -8 \\ -4x_1 + 6x_2 - x_3 = 7 \end{cases}$

$\Rightarrow$ rref of augmented matrix:

$\begin{bmatrix} 1 & 0 & -7/2 & 0 \\ 0 & 1 & -5/2 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ no possible solution

16. $\begin{cases} x_1 - 2x_4 = -3 \\ 2x_2 + 2x_3 = 0 \\ x_3 + 3x_4 = 1 \\ -2x_1 + 3x_2 + 2x_3 + x_4 = 5 \end{cases}$

consistent (not unique)

17. $\begin{cases} x_1 - 4x_2 = 1 & (\text{I}) \\ 2x_1 - x_2 = -3 & (\text{II}) \\ -x_1 - 3x_2 = 4 & (\text{III}) \end{cases}$

yes, because

(III) = (I) − (II)

& the 1st 2 equations have an intersection

21. $\begin{bmatrix} 1 & 3 & -2 \\ -4 & h & 8 \end{bmatrix}$

h = anything

22. $\begin{bmatrix} 2 & -3 & h \\ -6 & 9 & 5 \end{bmatrix}$

$h = -5/3$

23. a) true, p7
b) false
c) true
d) true

24. a) true
b) false
c) false
d) true

25. $K + 2g + h = 0$

29. switch Row 1 & Row 2

30. Row 2 $\leftrightarrow$ (Row 2) $\times -\frac{1}{2}$

33.
$$\begin{cases} 4T_1 - T_2 - T_4 = 30 \\ -T_1 + 4T_2 - T_3 = 60 \\ -T_2 + 4T_3 - T_4 = 70 \\ -T_1 - T_3 + 4T_4 = 40 \end{cases}$$

34.
$$\begin{cases} T_1 = 20 \\ T_2 = 27.5 \\ T_3 = 30 \\ T_4 = 22.5 \end{cases}$$