Sect 1.8
Answer key

1. $\begin{bmatrix} 2 \\ -6 \end{bmatrix}, \begin{bmatrix} 2a \\ 2b \end{bmatrix}$

2. $\bar{x} = \begin{bmatrix} .5 \\ 0 \\ -2 \end{bmatrix}, \begin{bmatrix} a/2 \\ b/2 \\ c/2 \end{bmatrix}$

3. $\bar{x} = \begin{bmatrix} 3 \\ 1 \\ 2 \end{bmatrix}$ unique

4. $\bar{X} = \begin{bmatrix} -5 \\ -3 \\ 1 \end{bmatrix}$ unique

~~5.~~ $\cancel{\bar{x} = \begin{bmatrix} 3 \\ 1 \\ 0 \end{bmatrix}}$ ~~not unique~~ ~~6.~~

7. $a = 5,\ b = 6$

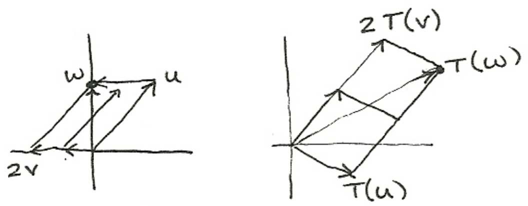
8. 5 rows & 4 columns

9. $\bar{x} = \begin{bmatrix} 9 \\ 4 \\ 1 \\ 0 \end{bmatrix} X_3 + \begin{bmatrix} -7 \\ -3 \\ 0 \\ 1 \end{bmatrix} X_4$

11. yes, b/c $[A\ \bar{b}]$ is consistent

17. $\begin{bmatrix} 6 \\ 3 \end{bmatrix}, \begin{bmatrix} -2 \\ 6 \end{bmatrix}, \begin{bmatrix} 4 \\ 9 \end{bmatrix}$

18.



$w = u + 2v$ $\qquad$ $T(w) = 2T(v) + T(u)$

19. $\begin{bmatrix} 13 \\ 7 \end{bmatrix}, \begin{bmatrix} 2x_1 - x_2 \\ 5x_1 + 6x_2 \end{bmatrix}$

20. $\begin{bmatrix} -2 & 7 \\ 5 & -3 \end{bmatrix}$

21. a) T
b) F
c) F
d) F
e) T

22. a) T
b) F
c) F
d) T
e) T

29. a) $b = 0,\ f(x) = mx$

then $f(cx+dy) = m(cx+dy)$

$= cmx + dmy = c(mx) + d(my)$

$= cf(x) + df(y)$

& $f(0) = 0$

$\therefore$ f is Linear

b) $b \neq 0,\ f(x) = mx + b$

$f(0) = b \neq 0$

not linear

c) f is called "Linear" b/c the graph of f is a line

30. $T(\bar{x}) = A\bar{x} + \bar{b},\ \bar{x} \in \mathbb{R}^n$

if $\bar{b} \neq 0$

then $T(0) = 0 + \bar{b} \neq 0$

$\therefore$ T not Linear

31. $\{v_1, v_2, v_3\}$ is Linearly independent.

Let c_1, c_2, c_3 be constants such that $c_1T(v_1) + c_2T(v_2) + c_3T(v_3) = 0$

$\Rightarrow T(c_1v_1) + T(c_2v_2) + T(c_3v_3) = 0$

$\Rightarrow T(c_1v_1 + c_2v_2 + c_3v_3) = 0$

T is Linear means

$c_1v_1 + c_2v_2 + c_3v_3 = 0$

$\{v_i\}$ independent means

$c_1 = c_2 = c_3 = 0$

$\therefore T(v_1), T(v_2), T(v_3)$ Lin Indep