P 33

29. Point Mass

$\vec{V}_1 = (2,-2,4)$ 4g

$\vec{V}_2 = (-4,2,3)$ 2g

$\vec{V}_3 = (4,0,-2)$ 3g

$\vec{V}_4 = (1,-6,0)$ 5g

$m = 4+2+3+5 = 14$ g

$$\vec{V} = \frac{1}{14}\left[4(2,-2,4) + 2(-4,2,3) + 3(4,0,-2) + 5(1,-6,0)\right]$$

$$= \frac{1}{14}(8-8+12+5,\ -8+4+0-30,\ 16+6-6+0)$$

$$= \frac{1}{14}(17,\ -34,\ 16)$$

$$= \left(\frac{17}{14},\ \frac{-17}{7},\ \frac{8}{7}\right)$$

33.

a. $(\vec{u}+\vec{v})+\vec{w} = \vec{u}+(\vec{v}+\vec{w})$

$(\vec{u}+\vec{v})+\vec{w} = (u_1+v_1,\ u_2+v_2,\ \cdots,\ u_n+v_n)+(w_1, w_2, \cdots, w_n)$

$= (u_1+v_1+w_1,\ u_2+v_2+w_2,\ \cdots,\ u_n+v_n+w_n)$

$= [u_1+(v_1+w_1),\ u_2+(v_2+w_2),\ \cdots,\ u_n+(v_n+w_n)]$

$= \vec{u}+(\vec{v}+\vec{w})$

b. $c(\vec{u}+\vec{v}) = c\vec{u}+c\vec{v}$

$c(\vec{u}+\vec{v}) = c(u_1+v_1,\ u_2+v_2,\ \cdots,\ u_n+v_n)$

$= [c(u_1+v_1), c(u_2+v_2), \cdots c(u_n+v_n)] = (cu_1+cv_1,\ cu_2+cv_2, \cdots, cu_n+cv_n)$

$= c\vec{u}+c\vec{v}$

P 40

1. not defined

The number of Rows on the right, 3, is not equal to the number of columns on the left, 2.

3. $\begin{bmatrix} 1 & 2 \\ -3 & 1 \\ 1 & 6 \end{bmatrix} \begin{bmatrix} -2 \\ 3 \end{bmatrix}$

a. $= -2\begin{bmatrix} 1 \\ -3 \\ 1 \end{bmatrix} + 3\begin{bmatrix} 2 \\ 1 \\ 6 \end{bmatrix} = \begin{bmatrix} -2 \\ 6 \\ -2 \end{bmatrix} + \begin{bmatrix} 6 \\ 3 \\ 18 \end{bmatrix} = \begin{bmatrix} 4 \\ 9 \\ 16 \end{bmatrix}$

b. $Ax = \begin{bmatrix} 1 & 2 \\ -3 & 1 \\ 1 & 6 \end{bmatrix} \begin{bmatrix} -2 \\ 3 \end{bmatrix} = \begin{bmatrix} 1 \times (-2) + 2 \cdot 3 \\ (-3) \times (-2) + 1 \cdot 3 \\ 1 \times (-2) + 6 \times 3 \end{bmatrix} = \begin{bmatrix} 4 \\ 9 \\ 16 \end{bmatrix}$

17. 3 rows.

According to Theorem 4, the equation $Ax = b$ doesn't have a solution for each b in R^4. because A doesn't contain a pivot position in each row.

19. No.

No.

If any one statement in Theorem 4 is false, then all four statement in Theorem 4 are false.

21. $\begin{bmatrix} 1 & 0 & 1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 1 & -1 \end{bmatrix}$ doesn't have a pivot in each row. so $\{v_1, v_2, v_3\}$ doesn't span R^4.

by Theorem 4.

23. a. False

b. True

c. False

d. True

e. True

f. True

25. $$\begin{bmatrix} 7 \\ -3 \\ 10 \end{bmatrix} = C_1 \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} + C_2 \begin{bmatrix} -3 \\ -2 \\ 2 \end{bmatrix} + C_3 \begin{bmatrix} 1 \\ 5 \\ 3 \end{bmatrix}$$

$$\begin{bmatrix} 4 & -3 & 1 \\ 5 & -2 & 5 \\ -6 & 2 & -3 \end{bmatrix} \begin{bmatrix} -3 \\ -1 \\ 2 \end{bmatrix} = (-3) \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} + (-1) \begin{bmatrix} -3 \\ -2 \\ 2 \end{bmatrix} + 2 \begin{bmatrix} 1 \\ 5 \\ 3 \end{bmatrix} = \begin{bmatrix} 7 \\ -3 \\ 10 \end{bmatrix}$$

$C_1 = -3 \quad C_2 = -1 \quad C_3 = 2$