1. $(7/9, 19/9, 4/3)$
2. $a = 5$
3. $A^{-1} = \frac{1}{7}\begin{bmatrix} 0 & 7 & 0 \\ -1 & 2 & 2 \\ 2 & -4 & 3 \end{bmatrix}$
4. (a) 1/2 (b) 2 (c) 250
5. (a) T (b) F (c) T
6. -3
7. $-\sqrt{6}(1, -2, 4)$
8. (a) yes (b) no (c) no (d) yes
9. $\begin{bmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & -\frac{1}{2} \end{bmatrix}$

11. (b) no (c) yes (d) no
12. Yes, $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ 2 \end{bmatrix} - \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$
13. 3
14. (a) $\begin{bmatrix} 1 \\ -1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 0 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ -1 \\ -2 \\ -1 \end{bmatrix}$

    (b) [1 1 0 0 0], [0 0 1 0 0], [0 0 0 1 −1]

    (c) $\begin{bmatrix} -1 \\ 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \\ 1 \end{bmatrix}$

    (d) $\begin{bmatrix} -1 \\ -1 \\ 1 \\ 0 \end{bmatrix}$

    (e) same as (c)

    (f) 3

    (g) 2
16. $\frac{1}{\sqrt{2}}\begin{bmatrix} 1 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \frac{1}{\sqrt{6}}\begin{bmatrix} -1 \\ 1 \\ 2 \\ 0 \end{bmatrix}, \frac{1}{\sqrt{12}}\begin{bmatrix} 1 \\ -1 \\ 1 \\ 3 \end{bmatrix}$

17. $\frac{1}{\sqrt{5}}\begin{bmatrix}-1\\2\\0\end{bmatrix}, \frac{1}{\sqrt{30}}\begin{bmatrix}2\\1\\5\end{bmatrix}$ (many other correct answers)

18. $w = \frac{2}{3}\begin{bmatrix}1\\1\\1\\0\end{bmatrix}, v = \frac{1}{3}\begin{bmatrix}1\\-2\\1\\0\end{bmatrix}$

21. $\lambda = 2,\ r\begin{bmatrix}1\\0\\0\end{bmatrix},\ r \neq 0$

$\lambda = 3,\ r\begin{bmatrix}2\\1\\0\end{bmatrix},\ r \neq 0$

$\lambda = 4,\ r\begin{bmatrix}1\\1\\1\end{bmatrix},\ r \neq 0$

$P = \begin{bmatrix}1&2&1\\0&1&1\\0&0&1\end{bmatrix}, D = \begin{bmatrix}2&0&0\\0&3&0\\0&0&4\end{bmatrix}$ (other correct answers possible).

22. $P = \frac{1}{\sqrt{6}}\begin{bmatrix}1&\sqrt{3}&\sqrt{2}\\1&-\sqrt{3}&\sqrt{2}\\-2&0&\sqrt{2}\end{bmatrix}$

$D = \begin{bmatrix}1&0&0\\0&1&0\\0&0&4\end{bmatrix}$ (other correct answers possible).

23. $P = \frac{1}{\sqrt{5}}\begin{bmatrix}-2&1\\1&2\end{bmatrix}, D = \begin{bmatrix}0&0\\0&5\end{bmatrix}$ (other correct answers possible).

24. $\frac{1}{3}\begin{bmatrix}10\\1\end{bmatrix}$

25. $y = \frac{1}{2} + \frac{3}{5}x$

26. $c_1\begin{bmatrix}1\\1\end{bmatrix} + c_2e^{4t}\begin{bmatrix}-1\\3\end{bmatrix}$

27. $e^{3t}\begin{bmatrix}2\\1\end{bmatrix} - e^{2t}\begin{bmatrix}1\\1\end{bmatrix}$

28. $c_1e^{2t}\begin{bmatrix}\sin 2t\\\cos 2t\end{bmatrix} + c_2e^{2t}\begin{bmatrix}-\cos 2t\\\sin 2t\end{bmatrix}$

The correct answer to # 25 is

$Y = \frac{3}{10} + \frac{7}{10}x$.

(The answer given would be correct if you use only the first four points.)