

21. (a) Unique solution: a is any real number;
 $x = 14 - 2a, y = 4a - 15, z = 9 - 2a$
 (b) Unique solution: $a \neq 3; x = -7, y = 17, z = 0$.
 Infinitely many solutions: $a = 3;$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} -7 \\ 17 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ -5 \\ 1 \end{pmatrix}$$

5 SEQUENCES AND SERIES

1. (a) -86 (b) 660
 2. (a) 6.5 (b) 33rd term
 (c) 24 or 41
 3. -0.669
 4. 128 or 384
 5. $a = 8, r = \frac{3}{2}$
 6. (a) $a = \frac{1}{2}, r = 4$
 (b) 9th term (c) 10
 7. (a) $-3, 7$ (b) 54
 8. (a) $\$32\,619$ (b) $\$1\,511\,552$
 (c) 13th year (d) 27
 9. (a) $\$185$ (c) 56
 10. (a) 1.77147 m
 (b) 11th (c) 57 m
 11. (b) $k = 2.5$ (c) 28 years

6 TRIGONOMETRY

1. $a = 3, b = 2$
 2. $f(x) \in \left[\frac{2}{7}, \frac{2}{3} \right]$
 3. $\frac{3\pi}{4}$
 10. $-\sqrt{\frac{5}{6}}$
 11. $-\frac{\sqrt{7}}{4}$
 12. $\frac{2}{\sqrt{5}}$

13. $x = \frac{\pi}{8}, \frac{7\pi}{8}$
 14. $x = -\frac{8\pi}{9}, -\frac{5\pi}{9}, -\frac{2\pi}{9}, \frac{\pi}{9}, \frac{4\pi}{9}, \frac{7\pi}{9}$
 15. $x = \frac{\pi}{36}, \frac{5\pi}{36}, \frac{25\pi}{36}, \frac{29\pi}{36}, -\frac{23\pi}{36}, -\frac{19\pi}{36}$
 16. $x = \frac{\pi}{6}, \frac{\pi}{3}, \frac{2\pi}{3}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{11\pi}{6}$
 17. $\theta = -1.89, -0.464, 1.25, 2.68$
 18. $x = \frac{2\pi}{3}, \frac{4\pi}{3}$
 19. $x = \pm \frac{\pi}{2}, \frac{\pi}{6}, \frac{5\pi}{6}$
 20. $\theta = \frac{\pi}{6}, \frac{5\pi}{6}$
 21. $R = 2, \theta = \frac{\pi}{6}$; minimum value $\frac{2}{5}$
 22. $R = \sqrt{34}, \alpha = 0.540$, maximum point $(0.540, \sqrt{34})$
 23. 6.75 cm
 24. 23.2
 25. 21.2 m

7 VECTORS

1. (a) $\overline{MN} = \frac{1}{2}(c - a)$ (b) $\overline{QP} = \frac{1}{2}(c - a)$
 2. (a) $\begin{pmatrix} -16 \\ -8 \\ 8 \end{pmatrix}$ (b) $4\sqrt{6} \approx 9.80$
 3. (a) $\begin{pmatrix} -3 \\ 6 \\ -1 \end{pmatrix}$ (b) $\frac{1}{\sqrt{46}} \begin{pmatrix} -3 \\ 6 \\ -1 \end{pmatrix}$
 4. (a) $r = \begin{pmatrix} -3 \\ 1 \\ 2 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 2 \\ 5 \end{pmatrix}$ (b) $(-3, 5, 12)$
 5. The lines do not intersect (they are skew).
 6. $x + 5y - 2z = 5$
 7. $2x - 13y - 5z = -25$
 8. (a) $(0, 5, 13)$ (b) $15x + 6y + z = 43$
 9. $r = \begin{pmatrix} 4 \\ -4 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}$