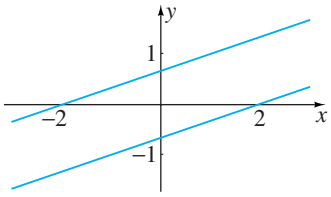
Answers to Even-Numbered Exercises

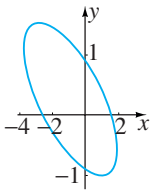
Exercises 9.7

2. $5Y^2 = 2$



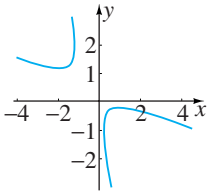
4. $10Y^2 = -3$

6. $11\sqrt{10}X^2 + 2X + \sqrt{10}Y^2 - 6Y = 8\sqrt{10}$

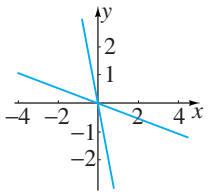


8. $11X^2 + Y^2 = -20$

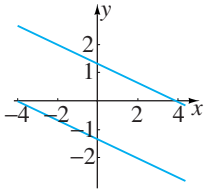
10. $3X^2 - Y^2 = -\sqrt{2}Y - 1$



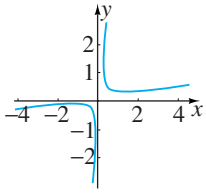
12. $3X^2 - Y^2 = 0$



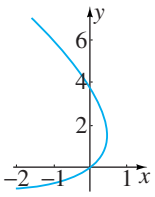
14. $5X^2 = 8$



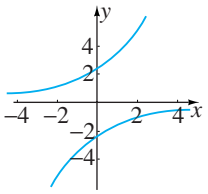
16. $6Y^2 - 4X^2 + \sqrt{2}X + 1 = 0$



18. $X^2 = 4Y$



22.



Exercises 14.12

8. $\boldsymbol{\theta}$, $\hat{\mathfrak{R}}$, $(1/\sqrt{6})(\sqrt{2}\hat{\mathfrak{R}} + \boldsymbol{\phi} + \sqrt{3}\boldsymbol{\theta})$; $-\boldsymbol{\phi}$, $-\boldsymbol{\phi}$, $(\hat{\mathfrak{R}} - \sqrt{2}\boldsymbol{\phi})/\sqrt{3}$

10. $r^2 z$, $-r^3\boldsymbol{\theta}$

12. $\mathfrak{R}^3 \sin^2\phi\cos\phi$, $-\mathfrak{R}^3 \sin^3\phi\,\boldsymbol{\theta}$

14. $3r\sin\theta\cos\theta - 2z\sin\theta$, $-3r\sin^2\theta - 2z\cos\theta$, $2r\cos\theta$;
$3\mathfrak{R}\sin^2\phi\sin\theta\cos\theta - 2\mathfrak{R}\sin\phi\cos\phi\sin\theta + 2\mathfrak{R}\sin\phi\cos\phi\cos\theta$,
$3\mathfrak{R}\sin\phi\cos\phi\sin\theta\cos\theta - 2\mathfrak{R}\cos^2\phi\sin\theta - 2\mathfrak{R}\sin^2\phi\cos\theta$,
$-3\mathfrak{R}\sin\phi\sin^2\theta - 2\mathfrak{R}\cos\phi\cos\theta$

16. $r\cos^2\theta + r^2\sin^2\theta$, $r^2\cos\theta - r\sin\theta\cos\theta$, $r^2\sin\theta\cos\theta$;
$\mathfrak{R}\sin^2\phi\cos^2\theta + \mathfrak{R}^2\sin^3\phi\sin\theta + \mathfrak{R}^2\sin^2\phi\cos\phi\sin\theta\cos\theta$,
$\mathfrak{R}\sin\phi\cos\phi\cos^2\theta + \mathfrak{R}^2\sin^2\phi\cos\phi\sin\theta - \mathfrak{R}^2\sin^3\phi\sin\theta\cos\theta$,
$\mathfrak{R}^2\sin^2\phi\cos\theta - \mathfrak{R}\sin\phi\sin\theta\cos\theta$

18. $(2r\cos^2\theta + 2r\sin\theta\cos\theta)\hat{\mathbf{r}} + (-2r\cos\theta\sin\theta - r\sin^2\theta + r\cos^2\theta)\boldsymbol{\theta} + \hat{\mathbf{k}}$, $(2\mathfrak{R}\sin^2\phi\cos^2\theta + 2\mathfrak{R}\sin^2\phi\sin\theta\cos\theta + \cos\phi)\hat{\mathfrak{R}} + (2\mathfrak{R}\sin\phi\cos\phi\cos^2\theta + 2\mathfrak{R}\sin\phi\cos\phi\sin\theta\cos\theta - \sin\phi)\boldsymbol{\phi} + (-2\mathfrak{R}\sin\phi\sin\theta\cos\theta + \mathfrak{R}\sin\phi\cos^2\theta - \mathfrak{R}\sin\phi\sin^2\theta)\boldsymbol{\theta}$

20. $-(2z/r^3)\hat{\mathbf{r}} + (1/r^2 + e^z)\hat{\mathbf{k}}$, $(-\mathfrak{R}^{-2}\cot\phi\csc\phi + \cos\phi e^{\mathfrak{R}\cos\phi})\hat{\mathfrak{R}} + (-\mathfrak{R}^{-2}\csc^3\phi - \mathfrak{R}^{-2}\cot^2\phi\csc\phi - \sin\phi e^{\mathfrak{R}\cos\phi})\boldsymbol{\phi}$

22. 3, 3

24. $4\sqrt{r^2+z^2}$, $4\mathfrak{R}$

26. $2z(\sin\theta - \cos\theta)\hat{\mathbf{r}} + 2(z\sin\theta + z\cos\theta - r)\boldsymbol{\theta} + 2r(\cos\theta - \sin\theta)\hat{\mathbf{k}}$,
$2\mathfrak{R}(\sin\theta - \cos\theta)\boldsymbol{\phi} + 2\mathfrak{R}(\cos\phi\sin\theta + \cos\phi\cos\theta - \sin\phi)\boldsymbol{\theta}$