

Answers to Review Exercises

1 a 78.5° **b** $3x - 13 = \frac{12 - 3y}{8} = \frac{z + 3}{2}$ **c** $r \cdot \begin{pmatrix} 7 \\ 11 \\ 9 \end{pmatrix} = 17$ **d** Intersects at $(5, 0, -2)$ **2 a** 9 **b** 9 **c** 8.46 **d** 1.476 **e** 0.508

2 f $\frac{71}{392}$ **g** $\frac{20}{71}$ **h**

X	6	7	8	9	10	11
$P(X = x)$	$\frac{3}{28}$	$\frac{5}{28}$	$\frac{6}{28}$	$\frac{7}{28}$	$\frac{4}{28}$	$\frac{3}{28}$

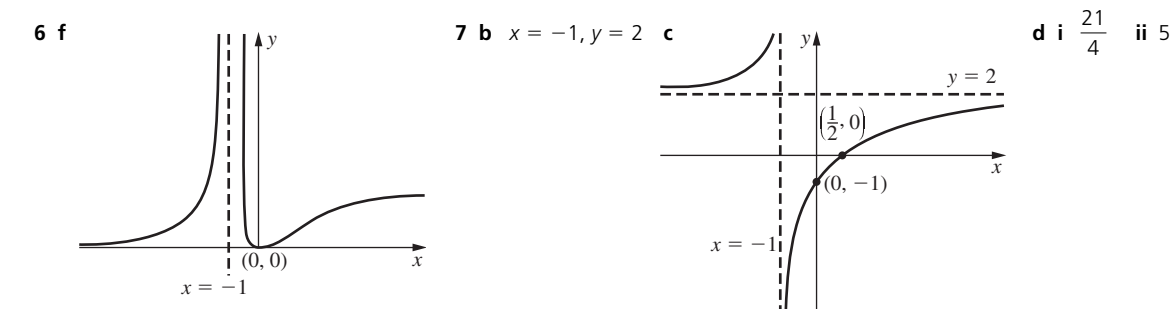
i $E(X) = 8.46, \text{Var}(X) = 2.18$

3 b 256 **c** $1 - i$ **d** $2^{\frac{1}{2}}e^{i\frac{\pi}{6}}, 2^{\frac{1}{2}}e^{i\frac{5\pi}{6}}, 2^{\frac{1}{2}}e^{-i\frac{\pi}{6}}, 2^{\frac{1}{2}}e^{-i\frac{5\pi}{6}}$ **4 a** $\pm 0.996, \pm 0.574, \pm 0.423$ **b** $\cos 6\theta = 1 - 18 \sin^2 \theta + 48 \sin^4 \theta - 32 \sin^6 \theta$

4 c $-\frac{31\pi}{36}, -\frac{19\pi}{36}, -\frac{7\pi}{36}, \frac{5\pi}{36}, \frac{17\pi}{36}, \frac{29\pi}{36}$ **d** $\sin\left(-\frac{31\pi}{36}\right), \sin\left(-\frac{19\pi}{36}\right), \sin\left(-\frac{7\pi}{36}\right), \sin\left(\frac{5\pi}{36}\right), \sin\left(\frac{17\pi}{36}\right), \sin\left(\frac{29\pi}{36}\right)$

5 a $25y = 25x - 16$ **b** $x = 5a \sec \theta$ **c** $\frac{dy}{dx} = \frac{3}{5} \csc \theta$

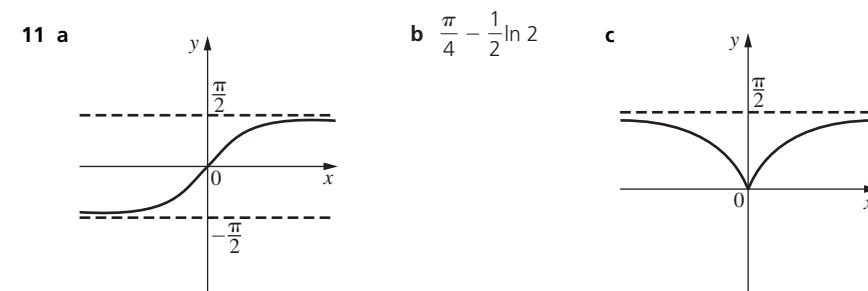
6 a $(f \circ g)(x) = \frac{7x + 1}{x + 1}$ $(g \circ f)(x) = \frac{6x + 2}{3x + 2}$ **b** 3.49 **c** $-1 < x < -\frac{2}{3}, -\frac{3}{5} \leq x \leq 0$ **d** 0.783 **e** 135.3 units³



8 b 10 **c** $x = \lambda, y = \frac{3\lambda - 10}{5}, z = \frac{2\lambda - 5}{10}$ **d** $\mathbf{r} = \begin{pmatrix} 0 \\ -2 \\ 1 \\ -\frac{1}{2} \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 3 \\ 1 \end{pmatrix}$ **e** $\left(1, 1, \frac{1}{2}\right)$ **f** 46.7°

9 b Tangent: $y = \frac{2}{3}x + \log_2 6 + 1$ Normal: $y = -\frac{3}{2}x + \log_2 6 + 1$ **c** $x = \frac{3}{2} - \frac{1}{2}\log_2 3, y = 3 - \log_2 3$

10 a 0.274 **b** 1204 **c** $\mu = 502, \sigma = 6.35$ **d** 0.624 **e i** 0.207 **ii** 0.380

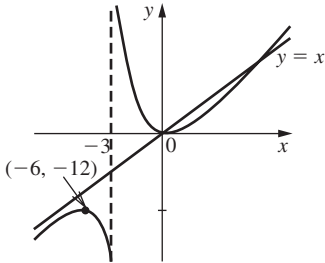


12 a i $f'(x) = \frac{1 - 2 \ln x}{x^3}$ **ii** $f''(x) = \frac{6 \ln x - 5}{x^4}$ **b** $x = e^{\frac{1}{2}}$ **d** $\left(e^{\frac{5}{6}}, \frac{5}{6}e^{-\frac{5}{6}}\right)$ **13 a** $y = 5e^{\frac{1}{2}x^2}$ **b** 0.417 **c** 0.639

14 b i $4 - \frac{\pi}{2}$ **iii** No, $\sin t = 4$ **15 a** $a = 5, d = 6$ **b i** $a = 40, r = \frac{1}{2}$ **ii** 80

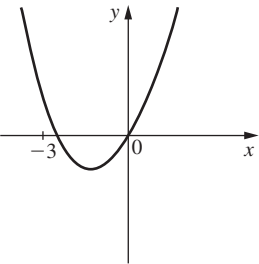
16 b i $\left(\frac{3}{2}, -\frac{1}{2}e^3\right)$ **ii** $(1, -e^2)$ **17 a** $x = -3$ and $y = x - 3$ **b** $(0, 0)$ minimum TP, $(-6, -12)$ maximum TP

17 c

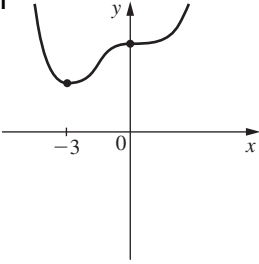


d $(0, 10)$ and $(-6, 22)$

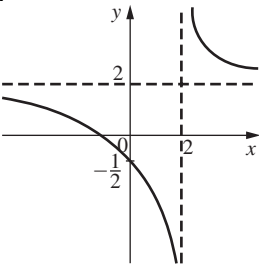
18 a i



ii



18 b i



b ii $\frac{2 + 2x}{1 - 4x}$ iii $x \in \mathbb{R}, x \neq \frac{1}{4}$ 19 a $y = 2 \cos 4\theta - 3$ b $\theta = \frac{\pi}{6}, \frac{\pi}{3}, \frac{2\pi}{3}, \frac{5\pi}{6}$ c $\sin(\alpha + \beta) = \frac{63}{65}$

20 a $z = -3.722, 0.361 + 1.599i, 0.361 - 1.599i$ b $z = 2e^{i\frac{\pi}{6}}$ c $-512i$