ANSWERS

Exercise 7.1

(1) (i) $\frac{1}{2}\begin{bmatrix}1 & 9 & 25\\ 0 & 4 & 16\end{bmatrix}$ (ii) $\frac{1}{4}\begin{bmatrix}1 & 5 & 9 & 13\\ 2 & 2 & 6 & 10\\ 5 & 1 & 3 & 7\end{bmatrix}$ (2) $\pm\sqrt{2}, -3, \frac{1}{2}, 1-\pi$

(3) 5 (4) $A=\frac{1}{3}\begin{bmatrix}-15 & 10 & -8\\ 10 & -5 & 5\end{bmatrix}$, $B=\frac{1}{3}\begin{bmatrix}-12 & 2 & -16\\ 8 & -4 & 13\end{bmatrix}$

(5) $A^4=\begin{bmatrix}1 & 4a\\ 0 & 1\end{bmatrix}$ (6) (ii) $\alpha=2n\pi\pm\frac{\pi}{3}, n\in\mathbb{Z}$ (7) $x=1$

(9) $k=2$ (12) $-I$ (14) $A=\begin{bmatrix}1 & -2\\ 2 & 0\end{bmatrix}$ (16) 3×4

(18) $A=\begin{bmatrix}1 & 3\\ 2 & 12\\ -5 & 0\end{bmatrix}$ (19) $x=-2,\ y=-1$ (20) (i) $x=3^{\frac{1}{3}}$ (ii) $p=-2, q=0, r=-3$

(21) $A=\begin{bmatrix}0 & -1 & -2\\ 1 & 0 & -1\\ 2 & 1 & 0\end{bmatrix}$, skew-symmetric (24) Pack I - ₹ 180, Pack II - ₹ 340, Pack III - ₹ 480

Exercise 7.2

(10) 0 (13) 0 (15) (i) 0 (ii) 0 (16) 4

(17) –81 (18) (19) –1, 2 (21) 7

Exercise 7.3

(3) $x=0$ (multiplicity 2), $x=-(a+b+c)$ (5) $x=0$ (multiplicity 2), $x=-12$

Exercise 7.4

(1) 2.5 sq.units (2) $k=-1, 7$ (3) (i) singular (ii) non-singular (iii) singular

(4) (i) $a=-\frac{6}{7}$ (ii) $b=\frac{49}{8}$ (5) $\frac{1}{2}$ (6) 6

Exercise 7.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2	1	1	2	2	2	4	4	2	4	2	4	3	2	4
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)					
3	3	4	1	3	2	3	3	1	2					

Exercise 8.1

(7) Other sides $\vec{b}-\vec{a}, -\vec{a}, \vec{a}-\vec{b}$ and other diagonal $\vec{b}-2\vec{a}$

Exercise 8.2

(1) (i) Not direction cosines (ii) direction cosines (iii) Not direction cosines

(2) (i) $\left(\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}\right)$ (ii) $\left(\frac{3}{\sqrt{19}}, \frac{-1}{\sqrt{19}}, \frac{3}{\sqrt{19}}\right)$ (iii) (0, 0, 1)

(3) (i) $\left(\frac{3}{\sqrt{89}}, \frac{-4}{\sqrt{89}}, \frac{8}{\sqrt{89}}\right)$, $(3,-4,8)$ (ii) $\left(\frac{3}{\sqrt{11}}, \frac{1}{\sqrt{11}}, \frac{1}{\sqrt{11}}\right)$, $(3,1,1)$

(iii) (0, 1, 0) and (0, 1, 0) (iv) $\left(\frac{5}{\sqrt{2338}}, \frac{-3}{\sqrt{2338}}, \frac{-48}{\sqrt{2338}}\right)$ and $(5,-3-48)$

(v) $\left(\frac{3}{\sqrt{34}}, \frac{4}{\sqrt{34}}, \frac{-3}{\sqrt{34}}\right)$ and $(3,4,-3)$ (vi) $\left(\frac{1}{\sqrt{2}}, 0, \frac{-1}{\sqrt{2}}\right)$ and $(1,0,-1)$

(4) $\left(\frac{-2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}\right), \left(\frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}, \frac{1}{\sqrt{6}}\right)$ and $\left(\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}\right)$

(5) $a = \pm\frac{1}{2}$ (6) $a=-1, b=2, c=-1$, or $a=1, b=-2, c=1$ (8) $\lambda = \frac{2}{3}$

(11) (i) $\sqrt{41}, \left(\frac{2}{\sqrt{41}}, \frac{1}{\sqrt{41}}, \frac{-6}{\sqrt{41}}\right)$ (ii) $\sqrt{1123}, \left(\frac{-15}{\sqrt{1123}}, \frac{27}{\sqrt{1123}}, \frac{13}{\sqrt{1123}}\right)$

(12) $\sqrt{44}+\sqrt{218}+\sqrt{110}$ (13) $\frac{1}{\sqrt{398}}(17\hat{i}-3\hat{j}-10\hat{k})$

(14) yes (16) $m = \pm\frac{1}{\sqrt{3}}$

Exercise 8.3

(1) (i) 9 (ii) 4 (2) (i) $\lambda = \frac{5}{2}$ (ii) $\lambda = -2$ (3) $\theta = \frac{\pi}{4}$

(4) (i) $\theta = \cos^{-1}\left(\frac{-9}{49}\right)$ (ii) $\theta = \frac{2\pi}{3}$ (5) $\theta = \frac{2\pi}{3}$ (8) –55

(11) $5\sqrt{2}$ (12) $\frac{41}{7}$ (13) 5 (14) –42

Exercise 8.4

(1) $\sqrt{507}$ (3) $\frac{\pm 10\sqrt{3}}{\sqrt{35}}(5\hat{i}-3\hat{j}+\hat{k})$ (4) $\pm\frac{(-\hat{i}+2\hat{j}-\hat{k})}{\sqrt{6}}$

(5) $8\sqrt{3}$ sq. units (6) $\frac{1}{2}\sqrt{165}$ sq. units (10) $\frac{\pi}{3}$

Exercise 8.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
3	3	4	2	2	3	4	4	2	3	2	1	1	1	3
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)					
4	1	4	4	1	3	2	4	3	2					

Exercise 9.1

(1) $\simeq 0.\overline{3}$ (2) 0.25 (3) $\frac{1}{2\sqrt{3}} \simeq 0.288$ (4) $\simeq 0.25$

(5) 1 (6) 0 (7) 1 (8) 3

(9) 2 (10) 3 (11) does not exist (12) does not exist

(13) 0 (14) 1 (15) does not exist

(16) except at $x_0 = 4$ (17) except at $x_0 = \pi$ (19) $f(8^-) = f(8^+) = 25$

(20) No (21) $f(2)$ cannot be concluded (22) 6, 6 (23) does not exist

Exercise 9.2

(1) 32 (2) $\frac{m}{n}$ (3) 108 (4) $\frac{1}{2\sqrt{x}}$

(5) $\frac{1}{6}$ (6) $-\frac{1}{4}$ (7) 3 (8) 4

(9) $\frac{1}{2}$ (10) $-\frac{1}{4}$ (11) $-\frac{3}{4}\sqrt[3]{4}$ (12) 0

(13) $f(x) \to -\infty$ as $x \to 0$ (limit does not exist) (14) $\frac{1}{4}$ (15) $\frac{1}{4a\sqrt{a-b}}$

Exercise 9.3

(1) (i) $f(-2) \to \infty$ as $x \to -2^-$, $f(-2) \to -\infty$ as $x \to -2^+$

(ii) $f\left(\frac{\pi}{2}\right) \to \infty$ as $x \to \frac{\pi}{2}^-$, $f\left(\frac{\pi}{2}\right) \to -\infty$ as $x \to \frac{\pi}{2}^+$

(2) $f(3) \to -\infty$ as $x \to 3^-$, $f(3) \to \infty$ as $x \to 3^+$ (3) $f(x) \to \infty$ as $x \to \infty$

(4) 0 (5) $f(x) \to \infty$ as $x \to \infty$ (6) -1 (7) $\frac{1}{4}$

(9) $\frac{1}{\alpha}$ (10) 30

Exercise 9.4

(1) e^7 (2) $e^{\frac{1}{3}}$ (3) 1 (4) $\frac{1}{e^8}$ (5) e^3

(6) $\frac{1}{8}$ (7) $\frac{\alpha}{\beta}$ (8) $\frac{2}{5}$ (9) $\begin{cases} 1 & \text{if } m = n \\ 0 & \text{if } m > n \\ f(\alpha) \to \infty \text{ as } \alpha \to 0 & \text{if } m < n \end{cases}$

(10) $2\cos a$ (11) $\frac{b}{a}$ (12) $\frac{2}{3}$ (13) $\frac{1}{2}$ (14) 2

(15) $\log\frac{2}{3}$ (16) $\log 9$ (17) $\frac{1}{2}$ (18) $\log 3 - 1$ (19) a

(20) $-\frac{3}{2}$ (21) e^2 (22) $\frac{1}{4\sqrt{2}}$ (23) 1 (24) e^2

(25) 2 (26) $a - b$ (27) $\frac{1}{2}$ (28) $\frac{1}{2}$

Exercise 9.5

(2) (i) continuous for all $x \in \mathbb{R}$ (ii) continuous in $\mathbb{R}$

(iii) continuous for all $x \in \mathbb{R} - (2n+1)\frac{\pi}{2}, n \in z$ (iv) continuous for all $x \in \mathbb{R}$

(v) continuous for $(0, \infty)$ (vi) continuous for all $x \in \mathbb{R} - \{0\}$

(vii) continuous for all $x \in \mathbb{R} - \{-4\}$ (viii) continuous for all $x \in \mathbb{R}$

(ix) continuous for all $x \in \mathbb{R} - \{-1\}$ (x) continuous for all $x \in \mathbb{R} - \frac{n\pi}{2}, n \in z$

(3) (i) not continuous at $x = 3$ (ii) continuous for all $x \in \mathbb{R}$

(iii) continuous for all $x \in \mathbb{R}$ (iv) continuous for all $x \in \left[0, \frac{\pi}{2}\right)$

(4) (i) continuous at $x_0 = 1$ (ii) not continuous at $x_0 = 3$

(6) $\alpha = 4$ (8) 6

(9) (i) not continuous at $x = 1$ (ii) not continuous at $x = 0$

(10) continuous at $x = 0, 1, 3$

(11) (i) removable discontinuity at $x = -2$, $g(x) = \begin{cases} \frac{x^2 - 2x - 8}{x+2} & \text{if} \quad x \neq -2 \\ -6 & \text{if} \quad x = -2 \end{cases}$

(ii) removable discontinuity at $x = -4$, $g(x) = \begin{cases} \frac{x^3 + 64}{x+4} & \text{if} \quad x \neq -4 \\ 48 & \text{if} \quad x = -4 \end{cases}$

(iii) removable discontinuity at $x = 9$, $g(x) = \begin{cases} \frac{3 - \sqrt{x}}{9 - x} & \text{if} \quad x \neq 9 \\ \frac{1}{6} & \text{if} \quad x = 9 \end{cases}$

(12) -2 (13) $f(0) = 0$ (14) $f(1) = \frac{2}{3}$

Exercise 9.6

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2	3	4	1	1	4	2	2	2	3	4	3	4	3	1
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)					
1	1	1	4	2	2	2	2	2	4					

Exercise 10.1

(1) (i) 0 (ii) -4 (iii) $-2x$

(2) (i) $f'(1^-) = -1$, $f'(1^+) = 1$, not differentiable (ii) $f'(x) \to -\infty$ as $x \to 1^-$, not differentiable

(iii) $f'(1^-) = 1$, $f'(1^+) = 2$, not differentiable

(3) (i) differentiable (ii) not differentiable

(iii) not differentiable (iv) not differentiable

(5) at $x = -1$ and $x = 8$ are cusps

at $x=4$ it is not continuous, at $x=11$, tangent is perpendicular

(6) does not exist

(7) (i) not differentiable at $x=n\pi, n\in z$ (ii) not differentiable at $x=(2n+1)\frac{\pi}{2}, n\in z$

Exercise 10.2

(1) $1-3\cos x$ (2) $\cos x-\sin x$ (3) $x\cos x+\sin x$

(4) $-\sin x-2\sec^2 x$ (5) $3t^2\cos t-t^3\sin t$ (6) $4\sec t\tan t+\sec^2 t$

(7) $e^x(\cos x+\sin x)$ (8) $\frac{x\sec^2 x-\tan x}{x^2}$ (9) $\frac{1}{1+\cos x}$

(10) $\frac{(1-x)\cos x+(1+x)\sin x}{(\sin x+\cos x)^2}$ (11) $\cos x+\sin x$ (12) $\frac{x\cos x-2\sin x}{x^3}$

(13) $\tan\theta\sec\theta+\cos\theta+\sin\theta$ (14) $-\frac{(1+\cos^2 x)}{\sin^3 x}$ (15) $x\cos 2x+\sin x\cos x$

(16) $e^{-x}\left[\frac{1}{x}-\log x\right]$ (17) $e^{-3x}\left[-3(x^2+5)\log(1+x)+\frac{x^2+5}{1+x}+2x\log(1+x)\right]$

(18) $\frac{\pi}{180}\cos\frac{\pi}{180}x$ (19) $\frac{\log_{10} e}{x}$

Exercise 10.3

(1) $5(2x+4)(x^2+4x+6)^4$ (2) $3\sec^2 3x$ (3) $-\sec^2 x\sin(\tan x)$

(4) $x^2(1+x^3)^{-\frac{2}{3}}$ (5) $\frac{1}{2\sqrt{x}}e^{\sqrt{x}}$ (6) $e^x\cos(e^x)$

(7) $7(3x^2+4)(x^3+4x)^6$ (8) $\frac{3}{2}\left(t-\frac{1}{t}\right)^{\frac{1}{2}}\left(1+\frac{1}{t^2}\right)$ (9) $\frac{1}{3}\sec^2 t(1+\tan t)^{-\frac{2}{3}}$

(10) $-3x^2\sin(a^3+x^3)$ (11) $-my$ (12) $20\sec 5x\tan 5x$

(13) $\frac{8(2x-5)^3}{(8x^2-5)^4}[-4x^2+30x-5]$ (14) $\frac{8x^3+14x}{3(x^2+2)^{\frac{2}{3}}}$ (15) $e^{-x^2}[1-2x^2]$

(16) $-\frac{3t^2}{2(t^3+1)^{\frac{3}{4}}(t^3-1)^{\frac{5}{4}}}$ (17) $\frac{14-3x}{2(7-3x)\sqrt{7-3x}}$ (18) $-\sin x\sec^2(\cos x)$

(19) $\sin x(1+\sec^2 x)$ (20) $\frac{5^{-\frac{1}{x}}(\log 5)}{x^2}$ (21) $\frac{\sec^2 x}{\sqrt{1+2\tan x}}$

(22) $3\sin x\cos x(\sin x-\cos x)$ (23) $-k\sin kx\sin(2\cos kx)$ (24) $-6\sin 2x(1+\cos^2 x)^5$

(25) $\frac{3e^{3x}+2e^{4x}}{(1+e^x)^2}$ (26) $\frac{2\sqrt{x}+1}{4\sqrt{x}\sqrt{x+\sqrt{x}}}$ (27) $e^{x\cos x}[\cos x-x\sin x]$

(28) $\dfrac{4\sqrt{x}\sqrt{x+\sqrt{x}}+2\sqrt{x}+1}{8\sqrt{x}\sqrt{x+\sqrt{x}}\sqrt{x+\sqrt{x+\sqrt{x}}}}$ (29) $\dfrac{\cos\left(\tan\sqrt{\sin x}\right)\sec^2\left(\sqrt{\sin x}\right)\cos x}{2\sqrt{\sin x}}$ (30) $\dfrac{-2}{1+x^2}$

Exercise 10.4

(1) $x^{\cos x}\left(\dfrac{\cos x}{x}-\sin x\log x\right)$ (2) $x^{\log x}\left(\dfrac{2\log x}{x}\right)+(\log x)^x\left[\dfrac{1}{\log x}+\log(\log x)\right]$

(3) $\dfrac{y(2x-1)}{x(1+2y)}$ (4) $\dfrac{y(x\log y-y)}{x(y\log x-x)}$ (5) $(\cos x)^{\log x}\left[\dfrac{\log(\cos x)}{x}-\tan x\log x\right]$

(6) $-\dfrac{b^2x}{a^2y}$ (7) $\dfrac{x\sqrt{x^2+y^2}+y}{x-y\sqrt{x^2+y^2}}$ (8) $\dfrac{1-\sec^2(x+y)-\sec^2(x-y)}{\sec^2(x+y)-\sec^2(x-y)}$

(10) $\dfrac{1}{2}$ (11) $\dfrac{6}{1+9x^2}$ (12) 1 (13) $-\tan t$

(14) $\tan t$ (15) $\dfrac{t^2-1}{2t}$ (16) $\dfrac{2}{1+x^2}$ (17) $\dfrac{3}{\sqrt{1-x^2}}$

(18) 1 (19) $\cos x^2$ (20) 2 (21) $\dfrac{1}{2}$

(22) -1 (23) $\dfrac{x}{(1-x^2)^{\frac{3}{2}}}$

Exercise 10.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
2	4	3	3	1	4	3	2	1	4	3	3	2	2	4
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)					
2	3	1	4	2	4	1	1	3	2					

Exercise 11.1

(1) (i) $\dfrac{x^{12}}{12}+c$ (ii) $-\dfrac{1}{6x^6}+c$ (iii) $\dfrac{3}{7}x^{\frac{7}{3}}+c$ (iv) $\dfrac{8}{13}x^{\frac{13}{8}}+c$

(2) (i) $-\cot x+c$ (ii) $\sec x+c$ (iii) $-\text{cosec}x+c$ (iv) $\tan x+c$

(3) (i) 12^3x+c (ii) $\log|x|+c$ (iii) e^x+c

(4) (i) $\tan^{-1}x+c$ (ii) $\sin^{-1}x+c$

Exercise 11.2

(1) (i) $\dfrac{(x+5)^7}{7}+c$ (ii) $\dfrac{1}{9(2-3x)^3}+c$ (iii) $\dfrac{2}{9}(3x+2)^{\frac{3}{2}}+c$

(2) (i) $\dfrac{-\cos 3x}{3}+c$ (ii) $-\dfrac{\sin(5-11x)+c}{11}$ (iii) $-\dfrac{\cot(5x-7)}{5}+c$

(3) (i) $\dfrac{1}{3}e^{3x-6}+c$ (ii) $-\dfrac{e^{8-7x}}{7}+c$ (iii) $-\dfrac{1}{4}\log|6-4x|+c$

(4) (i) $5\tan\frac{x}{5}+c$ (ii) $-\frac{1}{5}\operatorname{cosec}(5x+3)+c$ (iii) $-\frac{1}{15}\sec(2-15x)+c$

(5) (i) $\frac{1}{4}\sin^{-1}(4x)+c$ (ii) $\frac{1}{9}\sin^{-1}(9x)+c$ (iii) $\frac{1}{6}\tan^{-1}(6x)+c$

Exercise 11.3

(1) $\frac{(x+4)^6}{6}+\frac{1}{3(2-5x)^3}+\frac{\cot(3x-1)}{3}+c$ (2) $-2\sin(5-2x)+3e^{3x-6}-6\log|6-4x|+c$

(3) $5\tan\frac{x}{5}+9\sin 2x+2\sec(5x+3)+c$ (4) $2\sin^{-1}(4x)+9\sin^{-1}(3x)-3\tan^{-1}(5x)+c$

(5) $2\tan^{-1}(3x+2)+3\sin^{-1}(3-4x)+c$ (6) $\sin\left(\frac{x}{3}-4\right)+\log|7x+9|+5e^{\frac{x}{5}+3}+c$

Exercise 11.4

(1) $2x^2-5x+3$ (2) $3(x^3-x^2-1)$ (3) $2x^3-3x^2+5x+26$

(4) (i) 8 seconds (ii) 39.2 m/sec (iii) 78.4 m/sec

(5) (i) 2.4 sq.cm (ii) 0.4 sq.cm

Exercise 11.5

(1) $\frac{x^2}{2}+4x-3\log|x|-\frac{2}{x}+c$ (2) $\frac{x^2}{2}+\log|x|+2x+c$ (3) $\frac{8x^3}{3}+26x^2-180x+c$

(4) $\tan x-\cot x-2x+c$ (5) $2[\sin x+x\cos\alpha]+c$ (6) $-2\operatorname{cosec}2x+c$

(7) $-3\cot x-4\operatorname{cosec}x+c$ (8) $x-\sin x+c$ (9) $2\left[\frac{\sin 3x}{3}+\sin x\right]+c$

(10) $\frac{1}{2}\left[\frac{\sin 5x}{5}+\sin x\right]+c$ (11) $\frac{1}{2}\left[x-\frac{\sin 10x}{10}\right]+c$ (12) $-\frac{1}{8}\cos 4x+c$

(13) $\frac{(ae)^x}{\log(ae)}+c$ (14) $\frac{2}{15}(3x+7)^{\frac{5}{2}}-\frac{2}{3}(3x+7)^{\frac{3}{2}}+c$

(15) $\frac{2^{2x+2}}{\log 2}-\frac{2^{2-3x}}{3\log 2}+c$ (16) $\frac{2}{21}[(x+3)^{\frac{3}{2}}+(x-4)^{\frac{3}{2}}]+c$

(17) $2\log|x+3|-\log|x+2|+c$ (18) $\frac{1}{9}\log|x-1|-\frac{1}{9}\log|x+2|+\frac{1}{3(x+2)}+c$

(19) $\log\left|\frac{x+2}{x-1}\right|+3\tan^{-1}x+c$ (20) $\frac{x^2}{2}+3x-\log|x-1|+8\log|x-2|+c$

Exercise 11.6

(1) $\sqrt{1+x^2}+c$ (2) $\frac{1}{3}\tan^{-1}(x^3)+c$ (3) $\log|e^x+e^{-x}|+c$

(4) $\log|10^x+x^{10}|+c$ (5) $-2\cos\sqrt{x}+c$ (6) $\log|\log(\sin x)|+c$

(7) $\log\left|\log\left(\tan\frac{x}{2}\right)\right|+c$ (8) $\frac{1}{b^2}\log|a^2+b^2\sin^2 x|+c$ (9) $\frac{(\sin^{-1}x)^2}{2}+c$

(10) $(1+\sqrt{x})^2-4(1+\sqrt{x})+2\log\left|1+\sqrt{x}\right|+c$ (11) $\log|\log(\log x)|+c$

(12) $-e^{-\beta x^{\alpha}}+c$ (13) $2\sqrt{\sec x}+c$ (14) $\frac{(1-x)^{19}}{19}-\frac{(1-x)^{18}}{18}+c$

(15) $\frac{\sin^6 x}{6}-\frac{\sin^8 x}{8}+c$ (16) $(x-a)\cos a-\sin a\log|\sec(x-a)|+c$

Exercise 11.7

(1) (i) $e^{3x}[3x-1]+c$ (ii) $-\frac{x\cos 3x}{3}+\frac{\sin 3x}{9}+c$

(iii) $-e^{-5x}[5x+1]+c$ (iv) $x\sec x-\log|\sec x+\tan x|+c$

(2) (i) $\frac{x^2\log|x|}{2}-\frac{x^2}{4}+c$ (ii) $e^{3x}[9x^2-6x+2]+c$

(iii) $x^2\sin x+2x\cos x-2\sin x+c$ (iv) $-x^3\cos x+3x^2\sin x+6x\cos x-6\sin x+c$

(3) (i) $-\sin^{-1}x\sqrt{1-x^2}+x+c$ (ii) $\frac{1}{2}e^{x^2}[x^4-2x^2+2]+c$

(iii) $\frac{1}{2}\left[4x\tan^{-1}4x-\log\left|\sqrt{1+16x^2}\right|\right]+c$ (iv) $2\left[x\tan^{-1}x-\log\left|\sqrt{1+x^2}\right|\right]+c$

Exercise 11.8

(1) (i) $\frac{e^{ax}}{a^2+b^2}[a\cos bx+b\sin bx]+c$ (ii) $\frac{e^{2x}}{5}[2\sin x-\cos x]+c$

(iii) $\frac{e^{-x}}{5}[2\sin 2x-\cos 2x]+c$

(2) (i) $-\frac{e^{-3x}}{13}[3\sin 2x+2\cos 2x]+c$ (ii) $-\frac{e^{-4x}}{10}[2\sin 2x+\cos 2x]+c$

(iii) $\frac{e^{-3x}}{10}[\sin x-3\cos x]+c$

Exercise 11.9

(1) $e^x\log|\sec x|+c$ (2) $\frac{e^x}{2x}+c$ (3) $e^x\sec x+c$

(4) $e^x\tan x+c$ (5) $xe^{\tan^{-1}x}+c$ (6) $\frac{x}{1+\log|x|}+c$

Exercise 11.10

(1) (i) $\frac{1}{4}\log\left|\frac{2+x}{2-x}\right|+c$ (ii) $\frac{1}{20}\log\left|\frac{5+2x}{5-2x}\right|+c$ (iii) $\frac{1}{12}\log\left|\frac{3x-2}{3x+2}\right|+c$

(2) (i) $\frac{1}{2\sqrt{2}}\log\left|\frac{\sqrt{2}-3+x}{\sqrt{2}+3-x}\right|+c$ (ii) $\frac{1}{10}\log\left|\frac{x-4}{x+6}\right|+c$ (iii) $\log\left|x+2+\sqrt{x^2+4x+2}\right|+c$

(3) (i) $\log\left|x+2+\sqrt{(x+2)^2-1}\right|+c$ (ii) $\log\left|x-2+\sqrt{x^2-4x+5}\right|+c$ (iii) $\sin^{-1}\left(\frac{x-4}{5}\right)+c$

Exercise 11.11

(1) (i) $\log\ |x^2+4x-12|-\frac{7}{8}\log\left|\frac{x-2}{x+6}\right|+c$ (ii) $\frac{5}{2}\log|x^2+2x+2|-7\tan^{-1}(x+1)+c$

(iii) $\frac{3}{4}\log|2x^2-2x+3|+\frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{2x-1}{\sqrt{5}}\right)+c$

(2) (i) $5\sin^{-1}\frac{x-2}{\sqrt{13}}-2\sqrt{9+4x-x^2}+c$ (ii) $\sqrt{x^2-1}+2\log\left|x+\sqrt{x^2-1}\right|+c$

(iii) $2\sqrt{x^2+4x+1}-\log\left|x+2+\sqrt{x^2+4x+1}\right|+c$

Exercise 11.12

(1) (i) $\frac{x+1}{2}\sqrt{x^2+2x+10}+\frac{9}{2}\log\left|x+1+\sqrt{x^2+2x+10}\right|+c$

(ii) $\frac{x-1}{2}\sqrt{x^2-2x-3}-2\log\left|x-1+\sqrt{x^2-2x-3}\right|+c$

(iii) $\frac{x-5}{2}\sqrt{10x-x^2-24}+\frac{1}{2}\sin^{-1}(x-5)+c$

(2) (i) $\frac{1}{4}\left[(2x+5)\sqrt{9-(2x+5)^2}+9\sin^{-1}\left(\frac{2x+5}{3}\right)\right]+c$

(ii) $\frac{1}{4}\left[(2x+1)\sqrt{81+(2x+1)^2}+81\log\left|2x+1+\sqrt{81+(2x+1)^2}\right|\right]+c$

(iii) $\frac{x+1}{2}\sqrt{(x+1)^2-4}+2\log\left|x+1+\sqrt{(x+1)^2-4}\right|+c$

Exercise 11.13

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	3	4	1	3	1	3	2	4	3	4	2	4	4	1
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)					
1	3	2	4	1	3	4	3	1	4					

Exercise 12.1

(1) (i) permissible (ii) not permissible (iii) not permissible

(2) (i) $\frac{1}{2}$ (ii) 1 (3) (i) $\frac{5}{9}$ (ii) $\frac{4}{9}$ (4) (i) $\frac{1}{7}$ (ii) $\frac{2}{7}$ (5)(i) $\frac{7}{64}$ (ii) $\frac{247}{256}$ (iii) $\frac{37}{256}$

(6) $\frac{37}{100}$ (7) (i) $\frac{7}{33}$ (ii) $\frac{14}{55}$ (8) (i) $\frac{2}{13}$ (ii) $\frac{5}{13}$ (iii) $\frac{2}{13}$

(9) $\frac{627}{728}$ (10) (i) $\frac{5}{12}$ (ii) 2 to 3

Exercise 12.2

(1) (i) $\frac{5}{8}$ (ii) $\frac{1}{2}$ (iii)) $\frac{1}{8}$ (iv) 1 (2) (i) 0.50 (ii) 0.35 (iii) 0.20

(3) $\frac{11}{36}$ (4) (i) 0.8 (ii) 0.5 (iii) 0.3

(5) (i) 0.9984 (ii) 0.0016 (6) (i) 0.64 (ii) 0.44

Exercise 12.3

(1) No (3) 0.5 (4) (i) 0.5 (ii) 0.9

(5) $\frac{3}{8}$ (6) (i) $\frac{3}{5}$ (ii) $\frac{13}{30}$ (7) (i) 0.5 (ii) 0.375

(8) (i) $\frac{1}{4}$ (ii) $\frac{9}{40}$ (iii) $\frac{21}{40}$ (9) 0.75

(10) (i) 0.3 (ii) 0.5 (iii) 0.5 (iv) 0.5 (11) (i) $\frac{5}{28}$ (ii) $\frac{1}{14}$ (12) $\frac{13}{30}$

Exercise 12.4

(1) 0.028(2) (i) $\frac{11}{20}$ (ii) $\frac{6}{11}$ (3) (i) $\frac{7}{250}$ (ii) $\frac{3}{7}$

(4) $\frac{15}{41}$ (5) (i) $\frac{9}{25}$ (ii) $\frac{2}{3}$

Exercise 12.5

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
4	3	1	2	2	1	1	4	2	3	3	1	4	2	3
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)					
1	4	3	2	3	2	2	4	4	3					