(b) (i) $\frac{2}{4+x^2}$ (ii) $\frac{10}{25+4x^2}$

(c) (i) $\arcsin x+\frac{x}{\sqrt{1-x^2}}$

(ii) $2x\arccos x-\frac{x^2}{\sqrt{1-x^2}}$

(d) (i) $\frac{2x}{1+\left(x^2+1\right)^2}$

(ii) $\frac{-2x}{\sqrt{1-\left(1-x^2\right)^2}}$

2. $-\frac{3}{\sqrt{35}}$

4. $\frac{dy}{dx}=-\frac{1+\tan^2\left(\frac{1}{x}\right)}{x^2}$

5. (a) $\arcsin x+\frac{x}{\sqrt{1-x^2}}$

(b) $x\arcsin x+\sqrt{1-x^2}+c$

Mixed examination practice 18

Short questions

1. (a) $2x\arcsin x+\frac{x^2}{\sqrt{1-x^2}}$ (b) $\frac{e^y}{8y-xe^y}$

2. $\frac{2x}{\sqrt{1-\left(1-x^2\right)^2}}$

3. $\frac{16}{225}$

4. $y=\frac{14}{9}x+\frac{88}{9}$

5. $\frac{2\left(1-3x^4\right)}{\left(1+x^4\right)^2}$

6. $-\frac{1}{7}$

7. $\frac{5}{2}$

8. (b) $-\ln\frac{b}{c},\frac{a}{2b}$

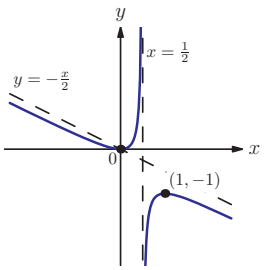
9. $\left(1,\frac{2\sqrt{e}-2}{\sqrt{e}}\right),\left(1,\frac{2\sqrt{e}+2}{\sqrt{e}}\right)$

Long questions

1. (a) $x=\frac{1}{2}$ (b) $(0,0),(1,-1)$

(c) $(0,0)$ local min $(1,-1)$ local max

(d)



2. (a) (ii) $\frac{(\ln 2)^2x^2-4x\ln 2+2}{2^x}$

(b) (i) $\frac{2}{\ln 2}$ (c) $\frac{2\pm\sqrt{2}}{\ln 2}$

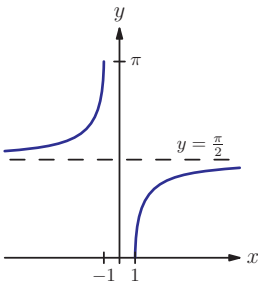
3. (c) $k=3,p=1$

4. (a) $(2,4),(-2,-4)$

(c) $(2,4)$ local max; $(-2,-4)$ local min

5. (a) $x\geq 1,x\leq -1$

(b)



(d) $\frac{1}{x\sqrt{x^2-1}}$

Chapter 19

Exercise 19A

1. (a) (i) $(x+3)^5+c$ (ii) $\frac{1}{6}(x-2)^6+c$

(b) (i) $\frac{1}{32}(4x-5)^8+c$ (ii) $2\left(\frac{1}{8}x+1\right)^4+c$

(c) (i) $-\frac{8}{7}\left(3-\frac{1}{2}x\right)^7+c$ (ii) $-\frac{1}{9}(4-x)^9+c$

(d) (i) $\frac{1}{3}(2x-1)^{\frac{3}{2}}+c$ (ii) $-\frac{4}{5}(2-5x)^{\frac{7}{4}}+c$

(e) (i) $4\left(2+\frac{x}{3}\right)^{\frac{3}{4}}+c$ (ii) $2(4-3x)^{-1}+c$

Mixed examination practice 19

Short questions

1. $\frac{\pi}{2}$

2. $\frac{1}{2}x\sin 2x+\frac{1}{4}\cos 2x+c$

3. 6.36

4. $\frac{\sqrt{3}}{4}$

5. (a) $-\frac{1}{3}\ln|1-3x|+c$

(b) $-\frac{1}{2}(2x+3)^{-1}+c$

6. $x\ln x-x+c$

7. (a) $\frac{e^{-2x}}{e^{-2x}+3}$

(b) $\frac{1}{2}\ln\left|\frac{1}{e^{-2x}+3}\right|+c$

8. $3\ln|x^2+4|+2\arctan\left(\frac{x}{2}\right)+c$

9. (b) $\ln\frac{7}{4}$

10. $\ln(\ln|x|)+c$

11. $\frac{8}{3}\left(\frac{1}{2}x-1\right)^{3/2}+8\left(\frac{1}{2}x-1\right)^{1/2}+c$

12. $3-3\ln\left(\frac{7}{4}\right)$

13. $x\arctan x-\frac{1}{2}\ln|1+x^2|+c$

14. $\frac{e-1}{e+1}$

Long questions

1. (a) A = 2 B = 2

(b) $2\ln|x+2|-\ln|x^2+1|+\arctan x+c$

(c) $\frac{4\pi}{3}-\frac{3}{2}$

2. (a) $x+c$

(b) $\ln|\sin x+\cos x|+c$

(c) $\frac{1}{2}\left(x-\ln|\sin x+\cos x|\right)+c$

3. (a) $\frac{1}{2}(1+t^2)$

(c) 1

4. (c) (i) $\frac{1}{32}\sin 4a+\frac{1}{4}\sin 2a+\frac{3}{8}a$

(ii) 2.96

Chapter 20

Exercise 20A

1. (a) (i) $144x^3$ (ii) $6x^2(x^3+1)$

(b) (i) $-6x\sin(3x^2)$ (ii) $2x\sec^2(x^2+1)$

2. (a) (i) 50 (ii) −12

(b) (i) −6 (ii) 1

(c) (i) $\pm\frac{1}{3}$ (ii) −2

3. (a) (i) 45 (ii) 176

(b) (i) 0.24 (ii) 0.006 67

4. 113 cm^2s^{-1}

5. 2 cms^{-1}

6. 2 cms^{-1}

7. 8.92 cm

8. 19.1 kmh^{-1}

Exercise 20B

1. (a) (i) $v=-8e^{-2t}$, $a=16e^{-2t}$

(ii) $v=-6e^{3t}$, $a=-18e^{3t}$

(b) (i) $v=\frac{5}{2}\cos\left(\frac{t}{2}\right)$, $a=-\frac{5}{4}\sin\left(\frac{t}{2}\right)$

(ii) $v=6\sin(2t)$, $a=12\cos(2t)$

2. (a) (i) t^3-t (ii) $\frac{1}{2}t-\frac{1}{8}t^4$

(b) (i) $2-2e^{-t}$ (ii) $t+\frac{1}{2}e^{2t}-\frac{1}{2}$

(c) (i) $3\ln\left(\frac{t+2}{2}\right)$ (ii) $3t-\ln(t+1)$

3. (a) (i) 1.73 (ii) 3.16

(b) (i) 2.22 (ii) 0.746

(c) (i) 3.23 (ii) 7.06