

# ANSWERS

## EXERCISE 7.1

1.  $-\frac{1}{2}\cos 2x$
2.  $\frac{1}{3}\sin 3x$
3.  $\frac{1}{2}e^{2x}$
4.  $\frac{1}{3a}(ax+b)^3$
5.  $-\frac{1}{2}\cos 2x - \frac{4}{3}e^{3x}$
6.  $\frac{4}{3}e^{3x} + x + C$
7.  $\frac{x^3}{3} - x + C$
8.  $\frac{ax^3}{3} + \frac{bx^2}{2} + cx + C$
9.  $\frac{2}{3}x^3 + e^x + C$
10.  $\frac{x^2}{2} + \log|x| - 2x + C$
11.  $\frac{x^2}{2} + 5x + \frac{4}{x} + C$
12.  $\frac{2}{7}x^{\frac{7}{2}} + 2x^{\frac{3}{2}} + 8\sqrt{x} + C$
13.  $\frac{x^3}{3} + x + C$
14.  $\frac{2}{3}x^{\frac{3}{2}} - \frac{2}{5}x^{\frac{5}{2}} + C$
15.  $\frac{6}{7}x^{\frac{7}{2}} + \frac{4}{5}x^{\frac{5}{2}} + 2x^{\frac{3}{2}} + C$
16.  $x^2 - 3\sin x + e^x + C$
17.  $\frac{2}{3}x^3 + 3\cos x + \frac{10}{3}x^{\frac{3}{2}} + C$
18.  $\tan x + \sec x + C$
19.  $\tan x - x + C$
20.  $2 \tan x - 3 \sec x + C$
21.  $C$
22.  $A$

## EXERCISE 7.2

1.  $\log(1+x^2) + C$
2.  $\frac{1}{3}(\log|x|)^3 + C$
3.  $\log|1+\log x| + C$
4.  $\cos(\cos x) + C$
5.  $-\frac{1}{4a}\cos 2(ax+b) + C$
6.  $\frac{2}{3a}(ax+b)^{\frac{3}{2}} + C$
7.  $\frac{2}{5}(x+2)^{\frac{5}{2}} - \frac{4}{3}(x+2)^{\frac{3}{2}} + C$

8.  $\frac{1}{6}(1+2x^2)^{\frac{3}{2}} + C$     9.  $\frac{4}{3}(x^2+x+1)^{\frac{3}{2}} + C$     10.  $2\log|\sqrt{x}-1| + C$
11.  $\frac{2}{3}\sqrt{x+4}(x-8) + C$
12.  $\frac{1}{7}(x^3-1)^{\frac{7}{3}} + \frac{1}{4}(x^3-1)^{\frac{4}{3}} + C$     13.  $-\frac{1}{18(2+3x^3)^2} + C$
14.  $\frac{(\log x)^{1-m}}{1-m} + C$     15.  $-\frac{1}{8}\log|9-4x^2| + C$     16.  $\frac{1}{2}e^{2x+3} + C$
17.  $-\frac{1}{2e^{x^2}} + C$     18.  $e^{\tan^{-1}x} + C$     19.  $\log(e^x + e^{-x}) + C$
20.  $\frac{1}{2}\log(e^{2x} + e^{-2x}) + C$     21.  $\frac{1}{2}\tan(2x-3) - x + C$
22.  $-\frac{1}{4}\tan(7-4x) + C$     23.  $\frac{1}{2}(\sin^{-1}x)^2 + C$
24.  $\frac{1}{2}\log|2\sin x + 3\cos x| + C$     25.  $\frac{1}{(1-\tan x)} + C$
26.  $2\sin\sqrt{x} + C$     27.  $\frac{1}{3}(\sin 2x)^{\frac{3}{2}} + C$     28.  $2\sqrt{1+\sin x} + C$
29.  $\frac{1}{2}(\log \sin x)^2 + C$     30.  $-\log|1+\cos x| + C$     31.  $\frac{1}{1+\cos x} + C$
32.  $\frac{x}{2} - \frac{1}{2}\log|\cos x + \sin x| + C$     33.  $\frac{x}{2} - \frac{1}{2}\log|\cos x - \sin x| + C$
34.  $2\sqrt{\tan x} + C$     35.  $\frac{1}{3}(1+\log x)^3 + C$     36.  $\frac{1}{3}(x+\log x)^3 + C$
37.  $-\frac{1}{4}\cos(\tan^{-1}x^4) + C$     38. D
39. B

**EXERCISE 7.3**

1.  $\frac{x}{2} - \frac{1}{8} \sin(4x+10) + C$
2.  $-\frac{1}{14} \cos 7x + \frac{1}{2} \cos x + C$
3.  $\frac{1}{4} \left[ \frac{1}{12} \sin 12x + x + \frac{1}{8} \sin 8x + \frac{1}{4} \sin 4x \right] + C$
4.  $-\frac{1}{2} \cos(2x+1) + \frac{1}{6} \cos^3(2x+1) + C$
5.  $\frac{1}{6} \cos^6 x - \frac{1}{4} \cos^4 x + C$
6.  $\frac{1}{4} \left[ \frac{1}{6} \cos 6x - \frac{1}{4} \cos 4x - \frac{1}{2} \cos 2x \right] + C$
7.  $\frac{1}{2} \left[ \frac{1}{4} \sin 4x - \frac{1}{12} \sin 12x \right] + C$
8.  $2 \tan \frac{x}{2} - x + C$
9.  $x - \tan \frac{x}{2} + C$
10.  $\frac{3x}{8} - \frac{1}{4} \sin 2x + \frac{1}{32} \sin 4x + C$
11.  $\frac{3x}{8} + \frac{1}{8} \sin 4x + \frac{1}{64} \sin 8x + C$
12.  $x - \sin x + C$
13.  $2(\sin x + x \cos x) + C$
14.  $-\frac{1}{\cos x + \sin x} + C$
15.  $\frac{1}{6} \sec^3 2x - \frac{1}{2} \sec 2x + C$
16.  $\frac{1}{3} \tan^3 x - \tan x + x + C$
17.  $\sec x - \operatorname{cosec} x + C$
18.  $\tan x + C$
19.  $\log |\tan x| + \frac{1}{2} \tan^2 x + C$
20.  $\log |\cos x + \sin x| + C$
21.  $\frac{\pi x}{2} - \frac{x^2}{2} + C$
22.  $\frac{1}{\sin(a-b)} \log \left| \frac{\cos(x-a)}{\cos(x-b)} \right| + C$
23. A
24. B

**EXERCISE 7.4**

1.  $\tan^{-1} x^3 + C$
2.  $\frac{1}{2} \log \left| 2x + \sqrt{1+4x^2} \right| + C$

3.  $\log \left| \frac{1}{2-x+\sqrt{x^2-4x+5}} \right| + C$
4.  $\frac{1}{5} \sin^{-1} \frac{5x}{3} + C$
5.  $\frac{3}{2\sqrt{2}} \tan^{-1} \sqrt{2} x^2 + C$
6.  $\frac{1}{6} \log \left| \frac{1+x^3}{1-x^3} \right| + C$
7.  $\sqrt{x^2-1} - \log |x+\sqrt{x^2-1}| + C$
8.  $\frac{1}{3} \log |x^3+\sqrt{x^6+a^6}| + C$
9.  $\log \left| \tan x + \sqrt{\tan^2 x + 4} \right| + C$
10.  $\log |x+1+\sqrt{x^2+2x+2}| + C$
11.  $\frac{1}{6} \tan^{-1} \left( \frac{3x+1}{2} \right) + C$
12.  $\sin^{-1} \left( \frac{x+3}{4} \right) + C$
13.  $\log \left| x - \frac{3}{2} + \sqrt{x^2-3x+2} \right| + C$
14.  $\sin^{-1} \left( \frac{2x-3}{\sqrt{41}} \right) + C$
15.  $\log \left| x - \frac{a+b}{2} + \sqrt{(x-a)(x-b)} \right| + C$
16.  $2\sqrt{2x^2+x-3} + C$
17.  $\sqrt{x^2-1} + 2 \log |x+\sqrt{x^2-1}| + C$
18.  $\frac{5}{6} \log |3x^2+2x+1| - \frac{11}{3\sqrt{2}} \tan^{-1} \left( \frac{3x+1}{\sqrt{2}} \right) + C$
19.  $6\sqrt{x^2-9x+20} + 34 \log \left| x - \frac{9}{2} + \sqrt{x^2-9x+20} \right| + C$
20.  $-\sqrt{4x-x^2} + 4 \sin^{-1} \left( \frac{x-2}{2} \right) + C$
21.  $\sqrt{x^2+2x+3} + \log |x+1+\sqrt{x^2+2x+3}| + C$
22.  $\frac{1}{2} \log |x^2-2x-5| + \frac{2}{\sqrt{6}} \log \left| \frac{x-1-\sqrt{6}}{x-1+\sqrt{6}} \right| + C$

$$23. 5\sqrt{x^2+4x+10} - 7\log|x+2+\sqrt{x^2+4x+10}| + C$$

24. B

25. B

### EXERCISE 7.5

$$1. \log \frac{(x+2)^2}{|x+1|} + C$$

$$2. \frac{1}{6} \log \left| \frac{x-3}{x+3} \right| + C$$

$$3. \log|x-1| - 5\log|x-2| + 4\log|x-3| + C$$

$$4. \frac{1}{2} \log|x-1| - 2\log|x-2| + \frac{3}{2} \log|x-3| + C$$

$$5. 4\log|x+2| - 2\log|x+1| + C$$

$$6. \frac{x}{2} + \log|x| - \frac{3}{4} \log|1-2x| + C$$

$$7. \frac{1}{2} \log|x-1| - \frac{1}{4} \log(x^2+1) + \frac{1}{2} \tan^{-1} x + C$$

$$8. \frac{2}{9} \log \left| \frac{x-1}{x+2} \right| - \frac{1}{3(x-1)} + C$$

$$9. \frac{1}{2} \log \left| \frac{x+1}{x-1} \right| - \frac{4}{x-1} + C$$

$$10. \frac{5}{2} \log|x+1| - \frac{1}{10} \log|x-1| - \frac{12}{5} \log|2x+3| + C$$

$$11. \frac{5}{3} \log|x+1| - \frac{5}{2} \log|x+2| + \frac{5}{6} \log|x-2| + C$$

$$12. \frac{x^2}{2} + \frac{1}{2} \log|x+1| + \frac{3}{2} \log|x-1| + C$$

$$13. -\log|x-1| + \frac{1}{2} \log(1+x^2) + \tan^{-1} x + C$$

$$14. 3\log|x+2| + \frac{7}{x+2} + C$$

$$15. \frac{1}{4} \log \left| \frac{x-1}{x+1} \right| - \frac{1}{2} \tan^{-1} x + C$$

$$16. \frac{1}{n} \log \left| \frac{x^n}{x^n+1} \right| + C$$

$$17. \log \left| \frac{2-\sin x}{1-\sin x} \right| + C$$

$$18. x + \frac{2}{\sqrt{3}} \tan^{-1} \frac{x}{\sqrt{3}} - 3 \tan^{-1} \frac{x}{2} + C$$

$$19. \frac{1}{2} \log \left( \frac{x^2+1}{x^2+3} \right) + C$$