

SATPREP

Assignment : Integration by Substitution

Integrate the functions in Exercises 1 to 37:

1. $\frac{2x}{1+x^2}$

2. $\frac{(\log x)^2}{x}$

3. $\frac{1}{x+x \log x}$

4. $\sin x \sin (\cos x)$

5. $\sin (ax+b) \cos (ax+b)$

6. $\sqrt{ax+b}$

7. $x \sqrt{x+2}$

8. $x \sqrt{1+2x^2}$

9. $(4x+2) \sqrt{x^2+x+1}$

10. $\frac{1}{x-\sqrt{x}}$

11. $\frac{x}{\sqrt{x+4}}, x > 0$

12. $(x^3-1)^{\frac{1}{3}} x^5$

13. $\frac{x^2}{(2+3x^3)^3}$

14. $\frac{1}{x(\log x)^m}, x > 0, m \neq 1$

15. $\frac{x}{9-4x^2}$

16. e^{2x+3}

17. $\frac{x}{e^{x^2}}$

18. $\frac{e^{\tan^{-1} x}}{1+x^2}$

19. $\frac{e^{2x}-1}{e^{2x}+1}$

20. $\frac{e^{2x}-e^{-2x}}{e^{2x}+e^{-2x}}$

21. $\tan^2 (2x-3)$

22. $\sec^2 (7-4x)$

23. $\frac{\sin^{-1} x}{\sqrt{1-x^2}}$

24. $\frac{2 \cos x-3 \sin x}{6 \cos x+4 \sin x}$

25. $\frac{1}{\cos^2 x(1-\tan x)^2}$

26. $\frac{\cos \sqrt{x}}{\sqrt{x}}$

27. $\sqrt{\sin 2x} \cos 2x$

28. $\frac{\cos x}{\sqrt{1+\sin x}}$

29. $\cot x \log \sin x$

30. $\frac{\sin x}{1+\cos x}$

31. $\frac{\sin x}{(1+\cos x)^2}$

32. $\frac{1}{1+\cot x}$

33. $\frac{1}{1-\tan x}$

34. $\frac{\sqrt{\tan x}}{\sin x \cos x}$

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

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

37. $\frac{x^3 \sin (\tan^{-1} x^4)}{1+x^8}$

Answer:

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. $-\frac{1}{8}\log|9-4x^2|$ 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. $-\log(1+\cos x)$ 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