

ELEMENTARY EXERCISE

1. $\int 2^x \cdot e^x dx$
2. $\int \frac{1 + \cos^2 x}{1 + \cos 2x} dx$
3. $\int \frac{1 - \tan^2 x}{1 + \tan^2 x} dx$
4. $\int \frac{1 + \tan^2 x}{1 + \cot^2 x} dx$
5. $\int \frac{e^{5/nx} - e^{4/nx}}{e^{3/nx} - e^{2/nx}} dx$
6. $\int (e^{a/nx} + e^{x/na}) dx (a > 0)$
7. $\int \frac{\cos 2x}{\cos^2 x \sin^2 x} dx$
8. $\int \frac{1 + 2x^2}{x^2(1 + x^2)} dx$
9. $\int 4 \cos \frac{x}{2} \cdot \cos x \cdot \sin \frac{21}{2} x dx$
10. $\int \frac{\cos x - \sin x}{\cos x + \sin x} (2 + 2 \sin 2x) dx$
11. $\int (3 \sin x \cos^2 x - \sin^3 x) dx$
12. $\int \cos x^\circ dx$
13. $\int \frac{(1+x)^2}{x(1+x^2)} dx$
14. $\int \frac{x}{2x+1} dx$
15. $\int \frac{\sec 2x - 1}{\sec 2x + 1} dx$
16. $\int \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} dx (\cos x + \sin x > 0)$
17. $\int \frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha} dx$
18. $\int \frac{x^6 - 1}{x^2 + 1} dx$
19. $\int \frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x} dx$
20. $\int \frac{x^4 + x^2 + 1}{2(1 + x^2)} dx$
21. $\int \sqrt{1 - \sin 2x} dx$
22. $\int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cdot \cos^2 x} dx$
23. $\int \frac{(\sqrt{x} + 1)(x^2 - \sqrt{x})}{x\sqrt{x} + x + \sqrt{x}} dx$
24. $\int \left[\sin^2 \left(\frac{9\pi}{8} + \frac{x}{4} \right) - \sin^2 \left(\frac{7\pi}{8} + \frac{x}{4} \right) \right] dx$
25. $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx$
26. A function g defined for all positive real numbers satisfies $g'(x^2) = x^3$ for all $x > 0$ and $g(1) = 1$. Compute $g(4)$.
27. $\int \left[\sin \alpha \sin(x - \alpha) + \sin^2 \left(\frac{x}{2} - \alpha \right) \right] dx$
28. $\int \frac{\sin 2x + \sin 5x - \sin 3x}{\cos x + 1 - 2 \sin^2 2x} dx$
29. $\int \left[\frac{\cot^2 2x - 1}{2 \cot 2x} - \cos 8x \cot 4x \right] dx$

$$30. \int \frac{\cos^4 x - \sin^4 x}{\sqrt{1 + \cos 4x}} dx (\cos 2x > 0)$$

$$31. \int \frac{2x^3 + 3x^2 + 4x + 5}{2x + 1} dx$$

$$32. \int \frac{(x^2 + \sin^2 x) \sec^2 x}{1 + x^2} dx$$

$$33. \int \frac{dx}{\sqrt{9 - 16x^2}}$$

$$34. \int \frac{dx}{25 + 4x^2}$$

$$35. \int \frac{2x + 3}{3x + 2} dx$$

$$36. \int \frac{dx}{1 + \sin x}$$

$$37. \int \frac{\cos 8x - \cos 7x}{1 + 2\cos 5x} dx$$

$$38. \int \frac{2 + 3x^2}{x^2(1 + x^2)} dx$$

$$39. \int \frac{(\sin 2x) - (\sin 2k)}{\sin x - \sin k + \cos x - \cos k}$$

$$40. \int \frac{x^2 + 3}{x^6(x^2 + 1)} dx$$

$$41. \int \sin x \cos x \cos 2x \cos 4x dx$$

$$42. \int x^x \ln(ex) dx$$