

# Integration Problems

1.  $\int (2x^3 + 5x + 1)e^{2x} dx$

2.  $\int \cos^2 x \tan^2 x dx$

3.  $\int e^{\cos 2x} \sin x \cos x dx$

4.  $\int \frac{\sec^2 x}{2 + \tan x} dx$

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

6.  $\int \sin^4 x dx$

7.  $\int \frac{e^x}{\sqrt{3 - e^{2x}}} dx$

8.  $\int \frac{x^3}{\sqrt{4 + x^2}} dx$

9.  $\int \frac{1}{\sqrt{x}(1 + 3\sqrt{x})} dx$

10.  $\int \frac{x^3 + 2x^2 + 3x + 4}{x^3 + 4x} dx$

11.  $\int \sqrt{9 - x^2} dx$

12.  $\int x^3 \ln x dx$

13.  $\int \frac{dx}{\sqrt{6x - x^2}}$

14.  $\int_0^{\pi/4} \sec x \tan^3 x dx$

15.  $\int (\sin x + \cos x)^2 \sin x dx$

16.  $\int \frac{1}{1 + \cos x} dx$

17.  $\int \frac{e^{2x}}{4 + e^{2x}} dx$

18.  $\int \frac{4}{x^2 + 2x + 10} dx$

19.  $\int \cos(4x) \sqrt{1 + \sin(4x)} dx$

20.  $\int \frac{1}{e^{-x} + e^x} dx$

21.  $\int e^{2x} \cos x dx$

22.  $\int \cot^6 x \csc^4 x dx$

23.  $\int \frac{x}{\sqrt{4 + x^2}} dx$

24.  $\int \frac{1 - \sin x}{\cos x} dx$

25.  $\int \frac{1}{x^2 \sqrt{1 + 4x^2}} dx$

26.  $\int \sqrt{2x - x^2} dx$

27.  $\int \frac{dx}{x \sqrt{\ln x}}$

28.  $\int e^{\sqrt{x}} dx$

29.  $\int \frac{x + 1}{x^2 - 4} dx$

30.  $\int \frac{x^2 + x + 1}{(x + 1)^2(x - 2)} dx$

## Answers

1.  $e^{2x}(x^3 - \frac{3}{2}x^2 + 4x - \frac{3}{2}) + C$

3.  $-\frac{1}{4}e^{\cos 2x} + C$

5.  $\frac{x^2}{2} - 3x + 8 \ln|x + 3| + C$

7.  $\arcsin\left(\frac{e^x}{\sqrt{3}}\right) + C$

9.  $\frac{2}{3} \ln|1 + 3\sqrt{x}| + C$

11.  $\frac{1}{2}x\sqrt{9 - x^2} + \frac{9}{2} \arcsin\left(\frac{x}{3}\right) + C$

13.  $\arcsin\left(\frac{x-3}{3}\right) + C$

15.  $\frac{2}{3} \sin^3 x - \cos x + C$

17.  $\frac{1}{2} \ln(4 + e^{2x}) + C$

19.  $\frac{1}{6}(1 + \sin 4x)^{3/2} + C$

21.  $\frac{2}{5}e^{2x} \cos x + \frac{1}{5}e^{2x} \sin x + C$

23.  $\sqrt{4 + x^2} + C$

25.  $-\frac{\sqrt{1 + 4x^2}}{x} + C$

27.  $2\sqrt{\ln x} + C$

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

2.  $\frac{x}{2} - \frac{1}{4} \sin 2x + C$

4.  $\ln|2 + \tan x| + C$

6.  $\frac{1}{4}\left(\frac{3x}{2} - \sin 2x + \frac{1}{8} \sin 4x\right) + C$

8.  $\frac{1}{3}(x^2 + 4)^{3/2} - 4(x^2 + 4)^{1/2} + C$

10.  $x + \ln|x| + \frac{1}{2} \ln|x^2 + 4| - \frac{1}{2} \arctan\left(\frac{x}{2}\right) + C$

12.  $\frac{1}{4}x^4 \ln x - \frac{1}{16}x^4 + C$

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

16.  $\csc x - \cot x + C$

18.  $\frac{4}{3} \arctan\left(\frac{x+1}{3}\right) + C$

20.  $\arctan(e^x) + C$

22.  $-\left(\frac{\cot^9 x}{9} + \frac{\cot^7 x}{7}\right) + C$

24.  $\ln\left|\frac{\sec x + \tan x}{\sec x}\right| + C$

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

28.  $2e^{\sqrt{x}}(\sqrt{x} - 1) + C$

30.  $\frac{1}{3(x+1)} + \frac{2}{9} \ln|x + 1| + \frac{7}{9} \ln|x - 2| + C$