

Integration

1. $\int x^n dx = \frac{x^{n+1}}{n+1} + C$
2. $\int 1 dx = x + C$
3. $\int \frac{1}{x} dx = \log|x| + C$
4. $\int e^x dx = e^x + C$
5. $\int a^x dx = \frac{a^x}{\log a} + C$
6. $\int \sin x dx = -\cos x + C$
7. $\int \cos x dx = \sin x + C$
8. $\int \tan x dx = -\log|\cos x| + C$ or $\log|\sec x| + C$
9. $\int \cot x dx = -\log|\csc x| + C$ or $\log|\sin x| + C$
10. $\int \sec^2 x dx = \log|\sec x + \tan x| + C$
11. $\int \csc x dx = \log|\csc x - \cot x| + C$
12. $\int \sec^2 x dx = \tan x + C$
13. $\int \csc^2 x dx = -\cot x + C$
14. $\int \sec x \tan x dx = \sec x + C$
15. $\int \cot x \csc x dx = -\csc x + C$
16. $\int \frac{1}{\sqrt{1-x^2}} = \sin^{-1} x$
17. $\int \frac{1}{1+x^2} = \tan^{-1} x$
18. $\int \frac{1}{x\sqrt{x^2-1}} = \sec^{-1} x$
19. $\int \frac{1}{\sqrt{1-x^2}} = \cos^{-1} x$
20. $\int \frac{1}{1+x^2} = \cot^{-1} x$
21. $\int \frac{1}{x\sqrt{x^2-1}} = \csc^{-1} x$
19. $\int \sin^2 x = \frac{1 - \cos 2x}{2}$
20. $\int \cos^2 x = \frac{1 + \cos 2x}{2}$
21. $\int \tan^2 x = \sec^2 x - 1$
22. $\int \cot^2 x = \csc^2 x - 1$

$$\begin{array}{r} 13 \\ \times 3 \\ \hline 39 \end{array}$$

$$\begin{array}{r} 13 \quad 13 \\ \times 2 \\ \hline 26 \end{array}$$

$$1 = 2A + 3B$$

$$A = -\frac{1}{13}$$

$$1 = 2A + 3 \frac{5}{13}$$

$$1 = 2A + \frac{34}{13}$$

$$A = \frac{3/6}{13}$$

put in ①

$$\sin x + \cos x = \frac{-1}{13} (2 \cos x - 3 \sin x) + \frac{5}{13} (2 \sin x + 3 \cos x)$$

$$= \int \frac{-1}{13} (2 \cos x - 3 \sin x) + \frac{5}{13} (2 \sin x + 3 \cos x) dx$$

$$(2 \sin x + 3 \cos x)$$

$$= -\frac{1}{13} \int \frac{2 \cos x - 3 \sin x}{2 \sin x + 3 \cos x} dx + \frac{5}{13} \int \frac{2 \sin x + 3 \cos x}{2 \sin x + 3 \cos x} dx$$

$$= \text{put } 2 \sin x + 3 \cos x = t$$

$$(2 \cos x - 3 \sin x) dx = dt$$

$$= -\frac{1}{13} \int \frac{1}{t} dt + \frac{5}{13} \int 1 dx$$

$$= -\frac{1}{13} \log |t| + \frac{5}{13} x + C$$

$$= -\frac{1}{13} \log |2 \sin x + 3 \cos x| + \frac{5}{13} x + C$$

$$= \int \frac{\sec^2 u/2}{2 \tan^2 u/2 + 4 \tan u/2 + 4} du$$

put $\tan u/2 = t$

$$\frac{1}{2} \sec^2 u/2 du = dt$$

$$\sec^2 u/2 du = 2 dt$$

$$= 2 \int \frac{dt}{2t^2 + 4t + 4}$$

$$= \frac{2}{2} \int \frac{dt}{t^2 + 2t + 2}$$

$$= \int \frac{dt}{t^2 + 2t + 2}$$

$$= \int \frac{dt}{(t+1)^2 + 1}$$

$$= \int \frac{dt}{(1)^2 + (t+1)^2}$$

$$= \frac{1}{1} \tan^{-1} \left(\frac{t+1}{1} \right) + C$$

$$= \tan^{-1} \left(\tan \frac{u}{2} + 1 \right) + C$$

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

$$\int \frac{1}{\left(\frac{1 - \tan^2 u/2}{1 + \tan^2 u/2} \right) - \left(\frac{2 \tan u/2}{1 + \tan^2 u/2} \right)}$$

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