

10. Let $u = 3x + 4$

$$du = 3 dx$$

$$\frac{1}{3} du = dx$$

$$\begin{aligned} \int \frac{dx}{\sqrt[3]{3x+4}} &= \frac{1}{3} \int u^{-1/3} du \\ &= \frac{1}{3} \cdot \frac{3}{2} u^{2/3} + C \\ &= \frac{1}{2} (3x+4)^{2/3} + C \end{aligned}$$

11. Let $u = t^2 + 5$

$$du = 2t dt$$

$$\frac{1}{2} du = t dt$$

$$\begin{aligned} \int \frac{t dt}{t^2+5} &= \frac{1}{2} \int \frac{1}{u} du = \frac{1}{2} \ln |u| + C \\ &= \frac{1}{2} \ln |t^2+5| + C \\ &= \frac{1}{2} \ln (t^2+5) + C \end{aligned}$$

12. Let $u = \frac{1}{\theta}$

$$du = -\frac{1}{\theta^2} d\theta$$

$$\begin{aligned} \int \frac{1}{\theta^2} \sec \frac{1}{\theta} \tan \frac{1}{\theta} d\theta &= -\int \sec u \tan u du \\ &= -\sec u + C \\ &= -\sec \frac{1}{\theta} + C \end{aligned}$$

13. Let $u = \ln y$

$$du = \frac{1}{y} dy$$

$$\begin{aligned} \int \frac{\tan(\ln y)}{y} dy &= \int \tan u du \\ &= \int \frac{\sin u}{\cos u} du \end{aligned}$$

Let $w = \cos u$

$$\begin{aligned} dw &= -\sin u du \\ &= -\int \frac{1}{w} dw \\ &= -\ln |w| + C \\ &= -\ln |\cos u| + C \\ &= -\ln |\cos(\ln y)| + C \end{aligned}$$

14. Let $u = e^x$

$$du = e^x dx$$

$$\begin{aligned} \int e^x \sec(e^x) dx &= \int \sec u du \\ &= \ln |\sec u + \tan u| + C \\ &= \ln |\sec(e^x) + \tan(e^x)| + C \end{aligned}$$

15. Let $u = \ln x$

$$du = \frac{1}{x} dx$$

$$\begin{aligned} \int \frac{dx}{x \ln x} &= \int \frac{1}{u} du \\ &= \ln |u| + C \\ &= \ln |\ln x| + C \end{aligned}$$

16. $\int \frac{dt}{t\sqrt{t}} = \int \frac{dt}{t^{3/2}}$

$$\begin{aligned} &= \int t^{-3/2} dt \\ &= -2t^{-1/2} + C \\ &= -\frac{2}{\sqrt{t}} + C \end{aligned}$$

17. Use tabular integration with $f(x) = x^3$ and $g(x) = \cos x$.

$f(x)$ and its derivatives	$g(x)$ and its integrals
x^3	$\cos x$
$3x^2$	$\sin x$
$6x$	$-\cos x$
6	$-\sin x$
0	$\cos x$

$$\begin{aligned} \int x^3 \cos x dx &= x^3 \sin x + 3x^2 \cos x - 6x \sin x - 6 \cos x + C \end{aligned}$$

18. Let $u = \ln x$

$$dv = x^4 dx$$

$$du = \frac{1}{x} dx$$

$$v = \frac{1}{5} x^5$$

$$\begin{aligned} \int x^4 \ln x dx &= \frac{1}{5} x^5 \ln x - \int \frac{1}{5} x^5 \left(\frac{1}{x} \right) dx \\ &= \frac{1}{5} x^5 \ln x - \frac{1}{5} \int x^4 dx \\ &= \frac{1}{5} x^5 \ln x - \frac{1}{25} x^5 + C \end{aligned}$$