

Guidelines for Integration

1. Memorize the basic formulas through #18 (see p. 503)

Table of Integration Formulas

Constants of integration have been omitted.

1. $\int x^n dx = \frac{x^{n+1}}{n+1} \quad (n \neq -1)$	2. $\int \frac{1}{x} dx = \ln x $
3. $\int e^x dx = e^x$	4. $\int b^x dx = \frac{b^x}{\ln b}$
5. $\int \sin x dx = -\cos x$	6. $\int \cos x dx = \sin x$
7. $\int \sec^2 x dx = \tan x$	8. $\int \csc^2 x dx = -\cot x$
9. $\int \sec x \tan x dx = \sec x$	10. $\int \csc x \cot x dx = -\csc x$
11. $\int \sec x dx = \ln \sec x + \tan x $	12. $\int \csc x dx = \ln \csc x - \cot x $
13. $\int \tan x dx = \ln \sec x $	14. $\int \cot x dx = \ln \sin x $
15. $\int \sinh x dx = \cosh x$	16. $\int \cosh x dx = \sinh x$
17. $\int \frac{dx}{x^2 + a^2} = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right)$	18. $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right), \quad a > 0$
*19. $\int \frac{dx}{x^2 - a^2} = \frac{1}{2a} \ln\left \frac{x-a}{x+a}\right $	*20. $\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln x + \sqrt{x^2 \pm a^2} $

2. **Simplify integrand:** multiply out, and/or use a trig identity, and/or some other algebraic manipulation.
3. Try u-substitution (look for a perfect du).
4. Look at the form of the integrand. If you see...
 - a. ...a product of polynomial and transcendental functions, try I.B.P.
 - b. ...a product of trig functions, use substitution tricks from section 7.2.
 - c. ...a radical, try trig sub (or maybe u-sub).
 - d. ...a rational integrand, try P.F.D.
5. Try again. If u-sub or (I.B.P.) didn't work the first time, try again setting u equal to some other quantity.

