§ 8.1: Using Basic Integration Formulas

1. $\displaystyle\int k\,dx = kx + C$ (any number k)

2. $\displaystyle\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$ $(n \neq -1)$

3. $\displaystyle\int \frac{1}{x}\,dx = \ln|x| + C$

4. $\displaystyle\int e^x\,dx = e^x + C$

5. $\displaystyle\int a^x\,dx = \frac{a^x}{\ln(a)} + C$ $(a > 0,\ a \neq 1)$

6. $\displaystyle\int \sin(x)\,dx = -\cos(x) + C$

7. $\displaystyle\int \cos(x)\,dx = \sin(x) + C$

8. $\displaystyle\int \sec^2(x)\,dx = \tan(x) + C$

9. $\displaystyle\int \csc^2(x)\,dx = -\cot(x) + C$

10. $\displaystyle\int \sec(x)\tan(x)\,dx = \sec(x) + C$

11. $\displaystyle\int \csc(x)\cot(x)\,dx = -\csc(x) + C$

12. $\displaystyle\int \tan(x)\,dx = \ln|\sec(x)| + C$

13. $\displaystyle\int \cot(x)\,dx = \ln|\sin(x)| + C$

14. $\displaystyle\int \sec(x)\,dx = \ln|\sec(x) + \tan(x)| + C$

15. $\displaystyle\int \csc(x)\,dx = -\ln|\csc(x) + \cot(x)| + C$

16. $\displaystyle\int \sinh(x)\,dx = \cosh(x) + C$

17. $\displaystyle\int \cosh(x)\,dx = \sinh(x) + C$

18. $\displaystyle\int \frac{1}{\sqrt{a^2 - x^2}}\,dx = \sin^{-1}\left(\frac{x}{a}\right) + C$ $(a > 0)$

19. $\displaystyle\int \frac{1}{a^2 + x^2}\,dx = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C$ $(a > 0)$

20. $\displaystyle\int \frac{1}{x\sqrt{x^2 - a^2}}\,dx = \frac{1}{a}\sec^{-1}\left|\frac{x}{a}\right| + C$ $(a > 0)$

21. $\displaystyle\int \frac{1}{\sqrt{a^2 + x^2}}\,dx = \sinh^{-1}\left(\frac{x}{a}\right) + C$ $(a > 0)$

22. $\displaystyle\int \frac{1}{\sqrt{x^2 - a^2}}\,dx = \cosh^{-1}\left(\frac{x}{a}\right) + C$ $(x > a > 0)$

Example 1 (Substitution): Evaluate the integral

$$\int_3^5 \frac{2x-3}{\sqrt{x^2-3x+1}}\,dx.$$

Example 2 (Complete the Square): Find

$$\int \frac{1}{\sqrt{8x-x^2}}\,dx.$$

Example 3 (Trig Identities): Calculate

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

Example 4 (Trig Identities): Find

$$\int_0^{\frac{\pi}{4}} \frac{1}{1-\sin(x)}\,dx.$$

Example 5 (Clever Substitution) Evaluate

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

Example 6 (Properties of Trig Integrals) Evaluate the integral

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x^3 \cos(x)\, dx.$$

Example 7 (Simplify the integrand if possible) Evaluate the integral

$$\int \frac{3x^2 - 7x}{3x + 2}\, dx.$$