■ **Section 7.5** exercises, *page 547*: 1, 3, 5, 7, 9, 11, 13, 15, 21, 20, 2, 4, 6, 12, 16, 18, 37, 38, 8, 14, 17, 26, .

As we have seen, integration is more challenging than differentiation. No hard and fast rules can be given as to which integration method applies in a given situation, but you can think about these steps as a guideline.

- Do we need to use algebra or trigonometric identities to **rewrite** the integrand so that we can apply basic integration formulas?
- What about an obvious u-**substitution**?
- If the integrand is a *rational function* but the above two steps couldn't solve the integral, think about **integration by partial fractions** (section 7.4).
- If the integrand is a *product* of a polynomial with a transcendental function (such as a trigonometric function, exponential, or logarithmic function), then you can try **integration by parts**.
- If the integrand involves radicals couldn't be solved by an obvious u-sub, you can think about using **trigonometric substitution** (section 7.3).
- Try again.

Obviously, the first step of integration is to remember basic integral formulas. See next page for the **Table of Integration Formulas**.

Table of Integration Formulas

$$\int x^n \, dx = \left(\frac{1}{n+1}\right) x^{n+1} + C \quad (n \neq -1)$$

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

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

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

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

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

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

$$\int e^x \, dx = e^x + C$$

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

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

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

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

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

$$\int \sinh x \, dx = \cosh x + C$$

$$\int \cosh x \, dx = \sinh x + C$$