Integrals with Trigonometric Substitution

Obj: To integrate expressions in the form of

a^2+x^2, a^2-x^2, or x^2-a^2

using a trigonometric substitution.

Trig substitutions:

- **For   a² + x², use   x = atanθ**

- **For   a² - x², use   x = asinθ**

- **For   x²-a², use   x = asecθ**

Also, don't forget these formulas:

- **sin²x + cos²x = 1**
- **tan²x + 1 = sec²x**
- **cot²x + 1 = csc²x**

- **sin²x = ½ (1-cos(2x))**
- **cos²x = ½(1+cos(2x))**

$$\int \frac{dx}{\sqrt{4 + x^2}}$$

$$\int \frac{x^2 dx}{\sqrt{9 - x^2}}$$

$$\int \frac{dx}{\sqrt{x^2 - 25}}$$

$$\int_0^2 \frac{dx}{8 + 2x^2}$$