Section 5.4 - Indefinite Integrals and the Total Change Theorem - p. 346 Stewart, 4th Ed.

The **indefinite integral** is notation for the general antiderivative:

Example. $\int x^2\,dx$ means the general antiderivative of x^2, or $13x^3 + C$.

It looks like the definite integral, but without the upper and lower limits.

In general: $\int f(x)\,dx = F(x)$ means $F'(x) = f(x)$.

Remember: the *definite* integral is a number (an area). The *indefinite* integral is a *function* (actually a family of functions which differ by "$+C$").

Another way to think of this is

$$\int_a^b f(x)\,dx = \left[\int f(x)\,dx\right]_a^b.$$

Know all of the antiderivatives (integrals) given on p. 347.

Some trig. examples:

Example 1: $\int \sin\theta\,d\theta =$ _____________ $+C$.

Example 2: $\int \sec^2 t\,dt =$ __________________________.

Example 3: $\int \frac{\sin\theta}{\cos^2\theta}\,d\theta$.

Use trig. identities: $\frac{\sin\theta}{\cos^2\theta} = \frac{1}{\cos\theta}\cdot\frac{\sin\theta}{\cos\theta} = \sec\theta\tan\theta$. So

$$\int \frac{\sin\theta}{\cos^2\theta}\,d\theta = \underline{\hspace{8cm}}.$$

Notes:

The **Total Change Theorem** is the same as the Fundamental Theorem, essentially. It is sometimes more convenient for certain applications. We'll skip it.