
14. Trig Integrals and Trig Substitution

Lec 13 mini review.

Integration by Parts: $\int uv' = uv - \int u'v$ or $\int u dv = uv - \int v du$

useful trig identities for some trig integrals:

$$\cos^2(x) + \sin^2(x) = 1$$

$$1 + \tan^2(x) = \sec^2(x)$$

$$\cos^2(x) = \frac{1}{2}(1 + \cos(2x))$$

$$\sin^2(x) = \frac{1}{2}(1 - \cos(2x))$$

COMMON STRATEGIES FOR TRIG INTEGRALS

$$\int \sin^m(x) \cos^n(x) dx$$

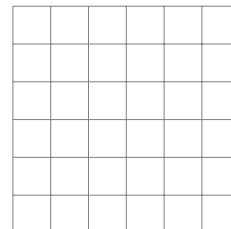
Example 14.1. $\int_{\pi/6}^{\pi/3} \cos^3(x) \, dx$

If you don't already have these antiderivatives memorized, you should add them to your repertoire:

Example 14.2. $\int \tan^3(x) \, dx$

TRIG SUBSTITUTION

Example 14.3. $\int_{-1}^1 \sqrt{1-x^2} \, dx$



General Strategy for Trig Substitution

Example 14.4. $\int \frac{1}{(4 - x^2)^{3/2}} dx$

Example 14.5. $\int \frac{x}{\sqrt{x^2 + 4}} dx$

Example 14.6. $\int \frac{1}{\sqrt{2x^2 + 8x + 6}} dx$

STUDY GUIDE

◇ **strategy for trig integrals: using trig identities**

◇ **trig substitution strategy for integrals such as** $\sqrt{1-x^2}$ $\sqrt{1+x^2}$ $\sqrt{x^2-1}$