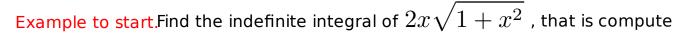
Chapter 4 Integrals

4.5 The Substitution Rule



$$\int 2x\sqrt{1+x^2}\,dx.$$

Example, Take 2. Compute the indefinite integral

$$\int 2x\sqrt{1+x^2}\,dx.$$

Substitution Rule. If u = g(x) is a differentiable function whose range is an interval I and f is continuous on I, then

$$\int f'(g(x))g'(x) dx = \int f(u) du.$$

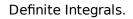
Relation between du and dx:

EXAMPLE 1 Find
$$\int x^3 \cos(x^4 + 2) dx$$
.

EXAMPLE 2 Evaluate
$$\int \sqrt{2x+1} dx$$
.

EXAMPLE 3 Find $\int \frac{x}{\sqrt{1-4x^2}} dx$.

EXAMPLE 5 Find $\int \sqrt{1 + x^2} x^5 dx$.



.....

EXAMPLE 7 Evaluate
$$\int_{1}^{2} \frac{dx}{(3-5x)^{2}}$$
.