Chapter 4 Integrals

4.5 The Substitution Rule



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

Another example. Compute the indefinite integral

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

4 The 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:

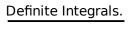
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EXAMPLE 1 Find $\int x^3 \cos(x^4 + 2) dx$.

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 $\int_1^2 \frac{dx}{(3-5x)^2}$.