

Math 1210 #27

The Second Fundamental Theorem of Calculus

Second Fundamental Theorem of Calculus

Let f be continuous on $[a, b]$ and F be any antiderivative of f on $[a, b]$.
Then

$$\int_a^b f(x)dx = F(b) - F(a)$$

EX 1

$$\int_{-1}^2 x^4 dx$$

EX 2

$$\int_{\pi/6}^{\pi/2} 2\sin t dt$$

Substitution Rule for Indefinite Integrals

Let g be differentiable and F be any antiderivative of f .
Then if $u = g(x)$,

$$\int f(g(x))g'(x)dx = \int f(u)du = F(u) + C = F(g(x)) + C$$

EX 3

$$\int \sqrt{x^3 + 1}(3x^2)dx$$

EX 4

$$\int_0^{\pi/2} \sin^2(3x)\cos(3x)dx$$

EX 5

$$\int_1^3 \frac{x^2 + 1}{\sqrt{x^3 + 3x}}dx$$

EX 6

$$\int_{-4}^{-1} \frac{1-s^4}{2s^2} ds$$

$$\int_a^b f(x) dx = F(b) - F(a)$$

$$\int_a^b f'(x) dx = f(b) - f(a)$$