Section 5.5

I. Differentiation: Chain Rule

A. Examples

II. Integration by Substitution: Reverse the Effects of the Chain Rule

A. Theorem Let $f(x) = g(u(x))u'(x)$ and let G be an anti-derivative of g. Then,

$$\int f(x)\,dx = \int g(u(x))u'(x)\,dx = \int G'(u(x))u'(x)\,dx = \int \left(G(u(x))\right)'\,dx = G(u(x)) + C$$

Note: $\int g(u(x))u'(x)\,dx = \int g(u)\,du = \int G'(u)\,du = G(u) + C = G(u(x)) + C$

III. Examples

A. Indefinite Integrals

B. Definite Integrals

1. Change of Limits