Evaluating Definite Integrals by Substitution
Section 5.9

Warm-up: Evaluate $\int 3x^2(1+x^3)^3\,dx, \qquad u = 1+x^3$

Method 1 for Evaluating Definite Integrals by Substitution

Example 1: Evaluate $\int_0^2 3x^2(1+x^3)^3\,dx$

Method 2 for Evaluating Definite Integrals by Substitution

Example 1: Evaluate $\int_0^2 3x^2(1+x^3)^3\,dx$

Example 2: Evaluate $\int_0^2 x(x^2+1)^3\,dx$

Example 3: Evaluate a) $\int_0^{3/4} \frac{dx}{1-x}$ b) $\int_0^{\ln 3} e^x(1+e^x)^{1/2}$

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Example 4: Evaluate $\int_0^{\pi/8} \sin^5 2x \cos 2x dx$

Example 5: Evaluate $\int_2^5 (2x-5)(x-3)^3 dx$

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Class Work

Use the given substitution to replace the given integral with an integral involving the variable *u*. (Do not evaluate the integral.)

1. $\int_0^2 \frac{x}{\sqrt{5-x^2}}dx, \quad u = 5-x^2$

2. $\int_0^1 \frac{e^{\sqrt{x}}}{\sqrt{x}}dx, \quad u = \sqrt{x}$

3. $\int_1^3 (2x-1)^3\,dx, \quad u = 2x-1$

4. $\int_0^4 3x\sqrt{25-x^2 dx}, \quad u = 25-x^2$

5. $\int_{-1/2}^{1/2} \cos(\pi\theta)d\theta, \quad u = \pi\theta$

6. $\int_0^1 (x+2)(x+1)^5\,dx, \quad u = x+1$

Evaluate the integral by making an appropriate substitution.

7. $\int_{-\pi}^{0} \sin(3x-\pi)dx$

8. $\int_2^3 \frac{x}{x^2-2}dx$

9. $\int_0^{\pi/2} \sqrt[3]{\sin x}\cos x dx$