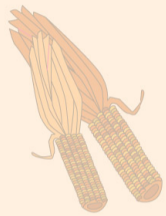
4.5 Integration by Substitution



Corn

In Exercises 7–34, find the indefinite integral and check the result by differentiation.

8. $\int (x^2 - 9)^3(2x)\,dx$

Nov 14 - 9:39 AM

10. $\int \sqrt[3]{(1 - 2x^2)}(-4x)\,dx$

Nov 14 - 9:39 AM

14. $\int x(4x^2 + 3)^3 \, dx$

Nov 14 - 9:39 AM

24. $\int \frac{x^3}{\sqrt{1 + x^4}} \, dx$

Nov 14 - 9:39 AM

In Exercises 35–38, solve the differential equation.

35. $\frac{dy}{dx} = 4x + \frac{4x}{\sqrt{16 - x^2}}$

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In Exercises 41–54, find the indefinite integral.

50. $\int \sqrt{\tan x}\,\sec^2 x\,dx$

Nov 14 - 9:39 AM

In Exercises 55 and 56, find an equation for the function f that has the indicated derivative and whose graph passes through the given point.

56. $f'(x) = \pi \sec \pi x \tan \pi x \qquad \left(\frac{1}{3}, 1\right)$

Nov 14 - 9:40 AM

In Exercises 57–64, find the indefinite integral by the method shown in Example 5.

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

Nov 14 - 9:40 AM

60. $\int (x + 1)\sqrt{2 - x}\, dx$

Nov 14 - 9:40 AM

In Exercises 65–76, evaluate the definite integral. Use a graphing utility to verify your result.

70. $\int_0^2 \frac{x}{\sqrt{1 + 2x^2}}\, dx$

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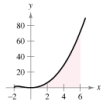
In Exercises 77–82, find the area of the region. Use a graphing utility to verify your result.

78. $\int_{-2}^{6} x^2 \sqrt[3]{x + 2}\, dx$



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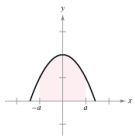
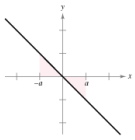
THEOREM 4.15 Integration of Even and Odd Functions

Let f be integrable on the closed interval $[-a, a]$.

1. If f is an *even* function, then $\int_{-a}^{a} f(x)\,dx = 2\int_{0}^{a} f(x)\,dx$.
2. If f is an *odd* function, then $\int_{-a}^{a} f(x)\,dx = 0$.



Even function



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In Exercises 91–94, evaluate the integral using the properties of even and odd functions as an aid.

92. $\int_{-\pi/2}^{\pi/2} \sin^2 x \cos x\,dx$

Nov 14 - 9:41 AM

Nov 14 - 9:41 AM