Custom Calculus Test Solutions

Solution to Problem 1

Find the derivative of: $\sqrt[3]{x}$

$$\frac{1}{3x^{\frac{2}{3}}}$$

Solution to Problem 2

Find the derivative of: $\operatorname{acos}(x)$

$$-\frac{1}{\sqrt{1-x^2}}$$

Solution to Problem 3

Find the integral of: $\sqrt[3]{x}$

$$\frac{3x^{\frac{4}{3}}}{4}+C$$

Solution to Problem 4

Find the integral of: $\frac{1}{x^2}$

$$-\frac{1}{x}+C$$

Solution to Problem 5

Use U-substitution to find the integral of: e^{2x}

$$\frac{e^{2x}}{2}+C$$

Solution to Problem 6

Use integration by parts to find the integral of: xe^x

$$(x-1)\,e^x+C$$

Solution to Problem 7

Find the integral of the trigonometric function: $\sin^2(x)$

$$\frac{x}{2} - \frac{\sin(2x)}{4} + C$$

Solution to Problem 8

Use trigonometric substitution to find the integral of: $\sqrt{x^2 - 1}$

$$\frac{x\sqrt{x^2 - 1}}{2} - \frac{\operatorname{acosh}(x)}{2} + C$$

Solution to Problem 9

Use partial fractions to find the integral of: $\frac{1}{x^2+1}$

$$\operatorname{atan}(x) + C$$

Solution to Problem 10

Find the improper integral of: $\frac{1}{x^2+1}$ from 1 to ∞

$$\frac{\pi}{4}$$

Solution to Problem 11

Find the limit of: $\sin(x)$ as x approaches ∞

$$\langle -1, 1 \rangle$$