Custom Calculus Test Solutions

Solution to Problem 1

Find the derivative of: $\sin(x)$

$$\cos(x)$$

Solution to Problem 2

Find the derivative of: $\log(\sqrt{x})$

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

Solution to Problem 3

Find the integral of: e^{-x}

$$-e^{-x} + C$$

Solution to Problem 4

Find the integral of: $\sec(x)$

$$-\frac{\log(\sin(x) - 1)}{2} + \frac{\log(\sin(x) + 1)}{2} + C$$

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: $\sin(x)\cos(x)$

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

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: $\log(\sqrt{x})$ as x approaches ∞

$$\infty$$