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: $\sec(x)$

$$\tan(x)\sec(x)$$

Solution to Problem 3

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

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

Solution to Problem 4

Find the integral of: $e^{\sin(x)}$

$$\int e^{\sin(x)}\,dx+C$$

Solution to Problem 5

Use U-substitution to find the integral of: $\sin(2x)$

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

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: $\cos^2(x)$

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

Solution to Problem 8

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

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

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: $\frac{1}{x^2+1}$ as x approaches 0

$$1$$