

Custom Calculus Test Solutions

Solution to Problem 1

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

$$-\frac{2x}{(x^2+1)^2}$$

Solution to Problem 2

Find the derivative of: x^3

$$3x^2$$

Solution to Problem 3

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

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

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: $\sin(2x)$

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

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: $\sin^2(x)$

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

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

$$1$$