Calculus Test Solutions

Solution to Problem 1:

Problem: Find the derivative of: x^4

Solution: $4x^3$

Solution to Problem 2:

Problem: Find the integral of: $\frac{1}{x^3}$

Solution: $-\frac{1}{2x^2} + C$

Solution to Problem 3:

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

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

Solution to Problem 4:

Problem: Use integration by parts to find the integral of: $x\log(x)$

Solution: $\frac{x^2 \cdot (2\log(x) - 1)}{4} + C$

Solution to Problem 5:

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

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

Solution to Problem 6:

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

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

Solution to Problem 7:

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

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

Solution to Problem 8:

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

Solution: $\frac{\pi}{4}$

Solution to Problem 9:

Problem: Find the limit of: $\lim_{x \to \infty} \cos(x)$

Solution: $\lim_{x \to \infty} \cos(x) = \langle -1, 1 \rangle$

Solution to Problem 10:

Problem: Find the sum of the series: $\sum_{n=0}^{\infty} \frac{x^n}{n!}$

Solution: e^x