

Math 141H.1, Honors Calculus II

Midterm Exam 1

Stephen G. Simpson

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1. Let a function f be defined by

$$f(x) = \log_{10} \sqrt{x^4 - 16} .$$

On which intervals is f one-to-one? For each of these intervals, find the inverse function of f .

2. If $\log_5 100 = a$, find $\log_{100} 5$.

3. Solve the initial value problem

$$\frac{dy}{dx} = \frac{1}{x^2 + 4} , \quad y(0) = 2 .$$

4. Find the derivative of $\log_2(\sec^{-1} x)$.

5. Simplify the expression

$$\ln \sqrt{x} + \ln(x\sqrt{x}) + \ln\left(\frac{5}{x^2}\right) + \log_2(32x) .$$

For which values of x is this expression defined?

6. Find the indefinite integral

$$\int \frac{dx}{\sqrt{16 + 6x - x^2}} .$$

7. Evaluate the definite integral

$$\int_{-3\sqrt{2}}^{-2\sqrt{3}} \frac{dx}{x\sqrt{x^2 - 9}} .$$

8. If $f(x) = x^5 + 2x - 8$ and $g = f^{-1}$, find $g'(-8)$.