

MATH 242, Fall 2006
Exam 1: October 4, 10:10-11:00

Only the blue book will be graded. On the front cover, please write **Form A** clearly, along with your name and section number. Please start each problem on a new page, circle final answers, and cross out incorrect work. **Unless otherwise noted, you must justify all answers to receive full credit.** You may not use calculators, notes, or any other kinds of aids.

1. (5 points each) Shown here is a graph of $y = f(x)$. Let $g(x) = f^{-1}(x)$. Find each value, if it exists. Remember to explain your answers.

(a) $g(0)$

(b) $g'(0)$

2. (10 points) Simplify $\sinh(\ln 2 - \ln 4)$ to a rational number.

3. (10 points each) Find y' in each case.

(a) $y = \ln(x^2 2^x)$

(b) $y = \frac{1}{e^{\cos x}}$

4. (15 points each) Evaluate each limit.

(a) $\lim_{x \rightarrow 0} x \tan^{-1} \left(\frac{1}{x} \right)$

(b) $\lim_{x \rightarrow 0} \frac{\tanh(5x^2)}{x^2}$

5. (15 points each) Evaluate each integral.

(a) $\int \frac{4x+1}{4x^2+1} dx$

(b) $\int e^{-x} \sqrt{1+e^{-x}} dx$

$$\frac{d}{dx} (\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} (\tan^{-1} x) = \frac{1}{1+x^2}$$