

## Math 12 Spring 2009: Exam 1

**Name:**

**Instructions:** There are 4 questions on this exam each of which is scored out of 8 points for a total of 32 points. You may not use any outside materials (eg. notes or calculators). You have 50 minutes to complete this exam. Remember to fully justify your answers.

**Score:**

**Problem 1.** Evaluate the following integrals.

(a)  $\int \frac{\sqrt{1-\sin^2 x}}{\sec^2 x \csc^4 x} dx$

(b)  $\int \frac{4x^4 - x + 1}{x^3 + 1} dx$

**Problem 2.** Evaluate the following limits.

(a)  $\lim_{x \rightarrow 0} \frac{2e^x - 2x - 2}{x^2}$

(b)  $\lim_{x \rightarrow \infty} x(e^{1/x} - 1)$ .

**Problem 3.**

(a) Find the derivative of  $f(x) = \sinh(\ln x)$ .

(b) Evaluate  $\int_0^1 2 \sinh x dx$ .

**Problem 4.** If the slope of the tangent line to a curve is given by  $\frac{dy}{dx} = \frac{\arcsin x}{x^2}$  and we know  $y(1) = 0$ , find the curve  $y(x)$ .