MATH 2A / Fall Quarter of 2006 September 19, 2006

Last Name: First Name: SID:

1. (4 points) Find the derivatives of the following functions:

   i) $f(x) = \sin^2 x + \log x^3 - \ln \frac{x}{2}$

   ii) $g(x) = \alpha \cot x + \sqrt{x} + \sqrt[7]{x^{x+1}}$, where $\alpha \neq 0$

2. (3 points) Evaluate the following integral:

$$\int_0^\infty e^{x^2}\, dx \quad \text{or} \quad \int_0^\infty \exp(x^2)\, dx$$

3. (3 points) Prove that $\sin x \leq x - \frac{x^3}{3!}$ for all real numbers $x$.