Math 128, Fall 2007
Section A, Quiz 1 Name: ______________________________

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. Please write down all relevant mathematics. You have 20 minutes.

1. State the Fundamental Theorem of Calculus and use it to compute

$$\int_0^1 e^{2x+3}dx$$

FTC says: If f is continuous on $[a, b]$ and F is an antiderivative for f, then

$$\int_a^b f(x)dx = F(b) - F(a)$$

An Antiderivative for the function e^{2x+3} is $\frac{1}{2}e^{2x+3}$,so by the FTC:

$$\begin{aligned}\int_0^1 e^{2x+3}dx &= \frac{1}{2}e^{2x+3}\Big|_0^1 \\ &= \frac{1}{2}[e^5 - e^3]\end{aligned}$$

2. Find the area between the two curves $y = x + 1$ and $y = x^2 - 1$.
Intersection points: Solve:

$$\begin{aligned} x^2 - 1 &= x + 1 \\ x^2 - x - 2 &= 0 \\ (x-2)(x+1) &= 0 \\ x &= 2, x = -1 \end{aligned}$$

By the intermediate value theorem, at x = 0, the curve $y = x + 1$ has greater value hence it lies above the curve $y = x^2 - 1$ on the interval $[-1, 2]$. So the area is:

$$\int_{-1}^2 (x+1)-(x^2-1)dx = \int_{-1}^2 2+x-x^2dx = 2x + \frac{x^2}{2} - \frac{x^3}{3}\Big|_{-1}^2 = 6 - \frac{8}{3} - (-2 + \frac{1}{2} + \frac{1}{3}) = /frac92$$