Arc Length

Solutions should show all of your work, not just a single final answer.

1. (a) Write the arc length of $y = x^3$ for $0 \le x \le 2$ as a definite integral with respect to x.

   (b) Write the arc length of $y = x^3$ for $0 \le x \le 2$ as a definite integral with respect to y.

   (c) Why is the integral in part (b) improper?

2. In order to approximate the arc length integral for $y = x^2$ for $1 \le x \le 2$ to within .0001 using the Trapezoid Rule with n subintervals, how large must n be? You will have to review the error bound for the Trapezoid Rule from Section 7.7. (Hint: the second derivative of $\sqrt{1 + (dy/dx)^2}$ is not a totally nasty function here; compute it carefully.)

3. T/F (with justification): The arc length of the graph of $y = \sin x$ for $0 \le x \le \pi/2$ equals $\displaystyle\int_0^{\pi/2} \sqrt{1 + \sin^2 x}\, dx$.