Name: SOLUTIONS

Quiz #6 - March 3, 2009

1. Estimate $\int_0^2 \sqrt{1+x^2}dx$ using the trapezoid rule and $n = 4$. You do not need to simplify your answer in any way.

$\Delta x = 1/2$

$A \approx \frac{\Delta x}{2}(f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4))$

$= \frac{\Delta x}{2}(f(0) + 2f(1/2) + 2f(1) + 2f(1.5) + f(2))$

$= \frac{1}{4}\left(1 + 2\sqrt{5/4} + 2\sqrt{2} + 2\sqrt{13/4} + \sqrt{5}\right)$

2. Set up, but do not evaluate, an integral which gives the length of the curve $y = xe^{-x}$ for $1 \leq x \leq 3$.

$y' = e^{-x} - xe^{-x}$

$A.L. = \int_1^3 \sqrt{1 + (e^{-x} - e^{-x})^2}\, dx$

Name: SOLUTIONS

Quiz #6 - March 5, 2009

1. Find the area of the surface obtained by rotating the curve $y = x^3, 0 \le x \le 2$ about the x axis.

$$\int_0^2 2\pi x^3 \sqrt{1 + (3x^2)^2}\, dx = \int_0^2 2\pi x^3 \sqrt{1+9x^4}\, dx$$

$$u = 1+9x^4 \quad du = 36x^3 dx \quad \text{so } x^3 dx = \frac{1}{36} du$$

$$\int \frac{\pi}{18} u^{1/2} du = \frac{2\pi}{54} (1+9x^4)^{3/2} \Big|_0^2$$

$$= \frac{2\pi}{54}\left(145^{3/2} - 1\right)$$

2. Set up, but do not evaluate, an integral which gives the length of the curve $y = \sin x$ for $0 \le x \le \pi/2$.

$$\int_0^{\pi/2} \sqrt{1+\cos^2 x}\, dx$$