Name: SOLUTIONS

Quiz #2 - January 29, 2009

1. Let $f(x) = \sqrt{x}$ on $[0, 4]$. Find the average value of $f(x)$ on this interval. Then find c in $[0, 4]$ such that $f_{ave} = f(c)$.

$$f_{ave} = \frac{1}{4}\int_0^4 \sqrt{x}\,dx = \frac{1}{4}\cdot\frac{2}{3}x^{3/2}\Big|_0^4 = \frac{1}{6}(4^{3/2}-0) = 8/6 = 4/3$$

$$\frac{4}{3} = \sqrt{x} \qquad \frac{16}{9} = x$$

$$c = 16/9$$

2. Calculate

$$\int te^{\frac{t}{2}}\,dt.$$

$$u = t \qquad v = 2e^{t/2}$$

$$du = dt \qquad dv = e^{t/2}$$

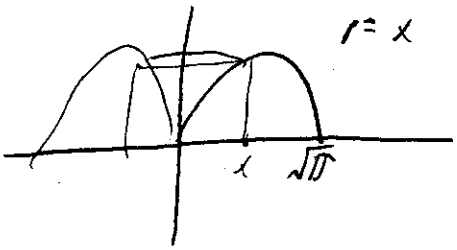
$$\int te^{t/2}\,dt = 2te^{t/2} - \int 2e^{t/2}$$

$$= 2te^{t/2} - 4e^{t/2} + C$$

Name: SOLUTIONS

Quiz #2 - January 27, 2009

1. Consider the region under the graph of $y = \sin(x^2)$ and above the x axis for $0 \le x \le \sqrt{\pi}$. Use the method of cylindrical shells to find the volume of the solid obtained by rotating this regional around the y axis.



$h = \sin(x^2)$

$r = x$

$$\int_0^{\sqrt{\pi}} 2\pi x \sin(x^2)\,dx$$

$$= 2\pi \int_0^{\sqrt{\pi}} x \sin(x^2)\,dx \qquad u = x^2 \quad du = 2x\,dx$$

$$= -\pi \left|\cos(x^2)\right|_0^{\sqrt{\pi}}$$

$$= -\pi \left|\cos\pi - \cos 0\right| = -\pi(-1-1)$$

$$= 2\pi$$

2. Find the average value of the function $f(x) = x + x^2$ on the interval $[0, 2]$.

$$\frac{1}{2}\int_0^2 x + x^2\,dx = \frac{1}{2}\left|x^2/2 + x^3/3\right|_0^2$$

$$= \frac{1}{2}(2 + 8/3)$$

$$= 1 + 8/6$$

$$= 7/3$$