PRINT Your Name:_____

Quiz – January 24, 2006

Find the length of

$$\begin{cases} x = \frac{1}{3}t^3 \\ y = \frac{1}{2}t^2 \end{cases}$$

for $0 \leq t \leq 1$.

Answer: The arc length is equal to

$$\int_0^1 \sqrt{(\tfrac{dx}{dt})^2 + (\tfrac{dy}{dt})^2}\, dt = \int_0^1 \sqrt{(t^2)^2 + (t)^2}\, dt = \int_0^1 t\sqrt{t^2+1}\, dt$$

$$= \tfrac{1}{2}\tfrac{2}{3}(t^2+1)^{3/2}\Big|_0^1 = \boxed{\tfrac{1}{3}((2)^{3/2} - 1).}$$