

Warm-Up Problems and Lecture Problems
March 17, 2003

1. (Review) Rotate the region in the plane bounded by $y = x^2$ and $y = 4x$ around the axis $y = -5$. Set up an integral representing the volume of this region.
2. Sketch the parametric curve and find the length (at least set up the integral!).
 - (a) $x = t^3/3, y = t^2/2, 0 \leq t \leq 1$.
(Remember that the formula for arc length is $L = \int_a^b \sqrt{(dx/dt)^2 + (dy/dt)^2} dt$.)
 - (b) $x = 4 \sin t, y = 4 \cos t - 5, 0 \leq t \leq \pi$.

Lecture Problems

3. Set up the integral representing the length of the curve (try to compute the integral if you have time – keep in mind that you might have to use numerics).

(a) $y = e^x$, from $(0, 1)$ to $(1, e)$.

(b) $y = \frac{x^3}{6} + \frac{1}{2x}$, $\frac{1}{2} \leq x \leq 1$.

(c) $y = \sin x$, $0 \leq x \leq 2\pi$.

(d) $x = y^4$, $-1 \leq y \leq 2$.