Review of Chapter 8

February 9, 2012

1. The integral $\int_0^{12} \pi(144 - h^2)\, dh$ represents the volume of a solid. Describe the solid.
2. A rectangular lake is 150km long and 3km wide. The vertical cross-section through the lake is an isosceles triangle with height 0.2km (this being how deep the lake is). Find the volume of the lake.
3. Find the volume of the region bounded by $y = \sqrt[3]{x}$, $x = 4y$ and rotated around the line $x = 9$.
4. Find the arc length of the curve $y = \cos x$ between $x = 0$ and $x = \pi$.
5. Rotating the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ about the x-axis generates an ellipsoid. Compute its volume.
6. Convert to polar coordinates the following Cartesian coordinates
   (a) $(-1, 0)$,
   (b) $(\sqrt{6}, -\sqrt{2})$,
   (c) $(-\sqrt{3}, 1)$.
7. Find the area inside the spiral $r = \theta$ for $0 \leq \theta \leq 2\pi$.
8. Find the arclength of the cartioid $r = 1 - \sin\theta$ between $\theta = 0$ and $\theta = \pi/2$.