Homework 10/6
Math 175 - Fall 2009

1. $\displaystyle\int \frac{dx}{(x^2+2x+2)^2}$
2. $\displaystyle\int \frac{dx}{\sqrt{9x^2+6x-8}}$
3. $\displaystyle\int \sqrt{5+4x-x^2}\,dx$
4. Sketch the curve $y=\sqrt{R^2-x^2}$, $0\le x\le R$. Use an integral to find its length.
5. Use an integral to find the area of the region bounded by this curve and the x-and y-axes.
6. Rotate the curve from Problem 4 about either the x- or y-axis (you choose) to form a surface. Use an integral to find the area of the surface.
7. Revolve the region from Problem 5 about either the x- or y-axis (you choose) to form a solid. Use an integral to find the volume of the solid.

Hints and Answers

1. $\displaystyle\frac{1}{2}\arctan(x+1)+\frac{1}{2(x^2+2x+2)}$
2. $\displaystyle\frac{1}{3}\ln\left|3x+1+\sqrt{9x^2+6x-8}\right|$
3. $\displaystyle\frac{9}{2}\arcsin\left(\frac{x-2}{3}\right)+\frac{x-2}{2}\sqrt{5+4x-x^2}$
4. $\displaystyle\frac{\pi R}{2}$. (Circumference of a circle is $2\pi R$.)
5. $\displaystyle\frac{\pi R^2}{4}$. (Area of a circle is πR^2.)
6. $2\pi R^2$. (Area of a sphere is $4\pi R^2$.)
7. $\displaystyle\frac{2}{3}\pi R^3$. (Volume of a sphere is $\displaystyle\frac{4}{3}\pi R^3$.)