MATH 230 NAME:
5.2

Directions: Show all work on a separate sheet of paper for full credit.

1. Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line. Sketch the region, the solid, and a typical disk or washer.

   (a) $y = \sqrt{x-1}$, $y = 0$, $x = 5$; about the x-axis $\int_1^5 \pi(x-1)\,dx = 8\pi$

   (b) $y = 6 - x^2$, $y = 2$; about the x-axis $\int_{-2}^{2} \left(6-x^2\right)^2 - 2^2\,dx = 384\pi/5$

   (c) $2x = y^2$, $x = 0$, $y = 4$; about the y-axis $\int_0^4 \pi\left(\frac{1}{2}y^2\right)^2\,dy = 256\pi/6$

   (d) $y^2 = x$, $x = 2y$; about the y-axis $\int_0^2 \pi(2y)^2 - \pi(y^2)^2\,dy = 64\pi/15$

   (e) $y = x^2$, $x = y^2$; about $y = 1$ $\int_0^1 \pi(1-x^2)^2 - \pi(1-\sqrt{x})^2\,dx = 11\pi/30$

   (f) $y = \sin(x)$, $y = \cos(x)$, $0 \le x \le \pi/4$; about $y = -1$

   $$\int_0^{\pi/4} \pi(\cos(x)+1)^2 - \pi(\sin(x)+1)^2\,dx = 2\sqrt{2}\pi - 3\pi/2$$

   (g) $y = x^2$, $x = y^2$; about $x = -1$ $\int_0^1 \pi(\sqrt{y}+1)^2 - \pi(y^2+1)^2\,dy = 29\pi/30$

   (h) $y = x^3$, $y = 0$, $x = 1$; about $x = 2$ $\int_0^1 \pi(2-y^{1/3})^2 - \pi(1)^2\,dy = 3\pi/5$