Math 152, Fall, 2004, Workshop 2

Honors Section

1. Start with the region $A$ in the first enclosed by the $x$-axis and the parabola $y = 2x(2 - x)$. Then obtain solids of revolution $S_1$, $S_2$, and $S_3$ by rotating $A$ about the line $y = 4$, $y = -2$, and $x = 4$, respectively. All three solids are (unusual) “doughnuts” which are 8 units across, whose holes are 4 units across, and whose heights are 2 units. Sketch them.

(a) Which do you expect to have larger volume, $S_1$ or $S_2$? Compute their volume and check your guess.

(b) Compute the volume of $S_3$.

2. Consider the first quadrant region $A$ bounded by the curve $y = x^2$, the tangent line to this curve at (1, 1), and the $x$-axis. Sketch this region.

(a) Set up an integral giving the volume of the solid obtained by rotating $A$ about the $y$-axis using the method of washers.

(b) Set up an integral giving the volume of the solid obtained by rotating $A$ about the $y$-axis using the method of cylindrical shells.

(c) Compute one of the integrals above to find this volume.

(d) Find the volume of the solid obtain by rotating $A$ about $x$-axis. You may use any method.