CALCULUS
WORKSHEET ON VOLUME BY CROSS SECTIONS

Work the following problems on notebook paper. For each problem, draw a figure, set up an integral, and then evaluate on your calculator. Give decimal answers correct to three decimal places.

1. Find the volume of the solid whose base is bounded by the graphs of $y = x + 1$ and $y = x^2 - 1$, with the indicated cross sections taken perpendicular to the x-axis.

(a) Squares
(b) Rectangles of height 1
(c) Semiellipses of height 2 (The area of an ellipse is given by the formula $A = \pi ab$.)
(d) Equilateral triangles

2. Find the volume of the solid whose base is bounded by the circle $x^2 + y^2 = 4$ with the indicated cross sections taken perpendicular to the x-axis.

(a) Squares
(b) Equilateral triangles
(c) Semicircles
(d) Isosceles triangles with the hypotenuse as the base of the solid

3. The base of a solid is bounded by $y = x^3$, $y = 0$, and $x = 1$. Find the volume of the solid for each of the following cross sections taken perpendicular to the y-axis.

(a) Squares
(b) Semicircles
(c) Equilateral triangles
(d) Semiellipses whose heights are twice the lengths of their bases