AP Calculus
Solids With Known Cross Sections

1. (Calculator) Find the volume of the solid whose base is bounded by the graphs of $y = 8 - x^2$ and $y = x^2$, with the indicated cross sections perpendicular to the x-axis.
   a. Squares
   b. Semi-Circles
   c. Equilateral Triangles

2. Set up the integral, (DO NOT SOLVE!), to find the volume of each solid described. The base of the volume is the region bounded by the curve $y = 2 + \sin x$, the y-axis, x-axis and $x = \frac{3\pi}{2}$. The cross sections perpendicular to the x-axis are:
   a. Squares
   b. Rectangles with height 1
   c. Semi-Circles
   d. Equilateral Triangles

3. (Calculator) The base of a solid is the region bounded by $y = x^2 - 2$ and $y = 3x + 8$. Find the volume of each solid whose cross sections perpendicular to the

   a. x-axis are semicircles
   b. y-axis are squares
   c. y-axis are equilateral triangles
   d. x-axis are rectangles with height of 4

4. (Calculator) The base of a solid is the region bounded by $y = \frac{1}{2}x^3$, y= 0, and x = 2. Find the volume of each solid whose cross sections perpendicular to the

   a. x-axis are squares
   b. x-axis are semi-circles
   c. y-axis are squares
   d. y-axis are equilateral triangles

ANSWERS

1. a) 136.533
   b) 53.617
   c) 59.121

2. a) $\int_0^{3\pi/2} (2+\sin x)^2\,dx$
   b) $\int_0^{3\pi/2} (2+\sin x)\,dx$
   c) $\int_0^{3\pi/2} \frac{\pi(2+\sin x)^2}{8}\,dx$
   d) $\int_0^{3\pi/2} \frac{(2+\sin x)^2\sqrt{3}}{4}\,dx$

3. a) 220.003
   b) 164.7
   c) 71.317
   d) 228.667

4. a) 4.571
   b) 1.795
   c) 1.6
   d) 0.693