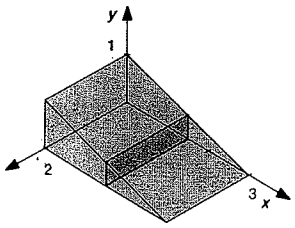
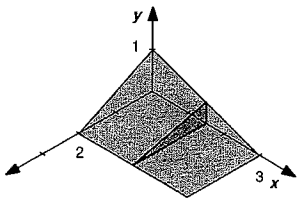
Exercises 6.2 Additional Problems

Set up and evaluate integrals that give the volume of the solids pictured in Exercises 1–12.

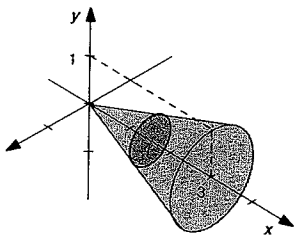
1 Cross sections are rectangles.



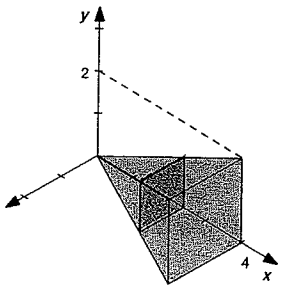
2 Cross sections are right triangles.



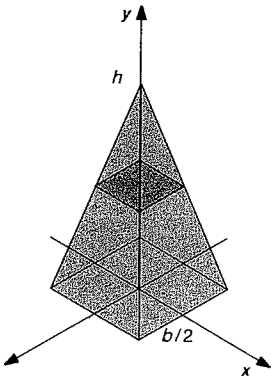
3 Cross sections are circles.



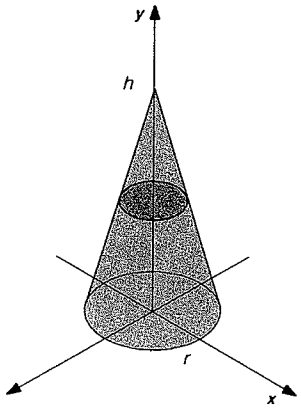
4 Cross sections are squares.



5 Cross sections are squares.



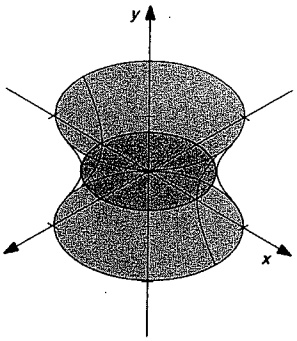
6 Cross sections are circles.



7 Intersection with the xy-plane is the region bounded by

$x^2 - y^2 = 1$, $y = 1$, and $y = -1$.

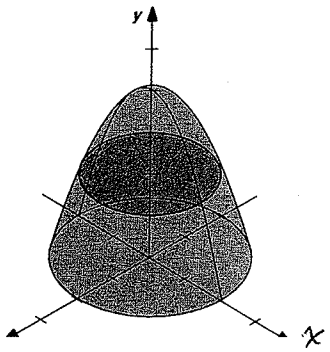
Cross sections perpendicular to the y-axis are circles with centers on the y-axis.



8 Intersection with the xy-plane is the region bounded by

$y = 4 - x^2$ and $y = 0$.

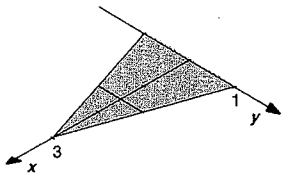
Cross sections perpendicular to the y-axis are circles with centers on the y-axis.



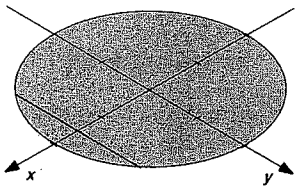
9 The base is the region in the xy-plane bounded by

$x + 3y = 3$, $x - 3y = 3$, and $x = 0$.

Cross sections perpendicular to the x-axis are (a) squares, (b) isosceles right triangles with hypotenuse on the base, (c) isosceles right triangles with one side on the base.



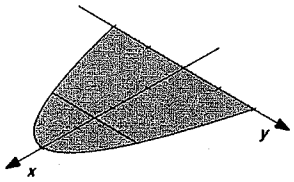
10 The base consists of the region in the xy-plane inside the circle $x^2 + y^2 = 4$. Cross sections perpendicular to the x-axis are (a) squares, (b) semicircles with diameter on the base, (c) equilateral triangles with one side on the base.



11 The base is the region in the xy-plane bounded by

$x = 4 - y^2$ and $x = 0$.

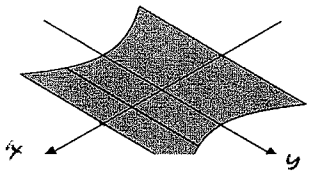
Cross sections perpendicular to the x-axis are (a) semicircles with diameter on the base, (b) equilateral triangles with one side on the base, (c) rectangles with height half the base.



12 The base is the region in the xy-plane bounded by

$y^2 - x^2 = 1$, $x = 1$, and $x = -1$.

Cross sections perpendicular to the x-axis are (a) semicircles with diameters on the base, (b) isosceles right triangles with hypotenuses on the base, (c) rectangles with height half the base.



Exercises 6.2 Additional Problem Answers to Odd Problems

1 $\int_0^3 \left(-\frac{2}{3}x+2\right) dx = 3$ **3** $\int_0^3 \frac{\pi x^2}{9} dx = \pi$

5 $\int_0^h \frac{b^2(h-y)^2}{h^2} dy = \frac{b^2 h}{3}$ **7** $\int_{-1}^1 \pi(1 + y^2)\, dy = \frac{8\pi}{3}$

9 (a) $\int_0^3 \frac{4}{9}(x - 3)^2\, dx = 4$ (b) $\int_0^3 \frac{1}{9}(x - 3)^2\, dx = 1$

(c) $\int_0^3 \frac{2}{9}(x - 3)^2\, dx = 2$

11 (a) $\int_0^4 \frac{\pi}{2}(4 - x)\, dx = 4\pi$ (b) $\int_0^4 \sqrt{3}(4 - x)\, dx = 8\sqrt{3}$

(c) $\int_0^4 2(4 - x)\, dx = 16$