

1-12 ||| Find the area of the surface.

1. The part of the plane  $z = 2 + 3x + 4y$  that lies above the rectangle  $[0, 5] \times [1, 4]$
2. The part of the plane  $2x + 5y + z = 10$  that lies inside the cylinder  $x^2 + y^2 = 9$
3. The part of the plane  $3x + 2y + z = 6$  that lies in the first octant
4. The part of the surface  $z = 1 + 3x + 2y^2$  that lies above the triangle with vertices  $(0, 0)$ ,  $(0, 1)$ , and  $(2, 1)$
5. The part of the cylinder  $y^2 + z^2 = 9$  that lies above the rectangle with vertices  $(0, 0)$ ,  $(4, 0)$ ,  $(0, 2)$ , and  $(4, 2)$
6. The part of the paraboloid  $z = 4 - x^2 - y^2$  that lies above the  $xy$ -plane
7. The part of the hyperbolic paraboloid  $z = y^2 - x^2$  that lies between the cylinders  $x^2 + y^2 = 1$  and  $x^2 + y^2 = 4$
8. The surface  $z = \frac{2}{3}(x^{3/2} + y^{3/2})$ ,  $0 \leq x \leq 1$ ,  $0 \leq y \leq 1$
9. The part of the surface  $z = xy$  that lies within the cylinder  $x^2 + y^2 = 1$
10. The part of the sphere  $x^2 + y^2 + z^2 = 4$  that lies above the plane  $z = 1$
11. The part of the sphere  $x^2 + y^2 + z^2 = a^2$  that lies within the cylinder  $x^2 + y^2 = ax$  and above the  $xy$ -plane
12. The part of the sphere  $x^2 + y^2 + z^2 = 4z$  that lies inside the paraboloid  $z = x^2 + y^2$

**7-16** |||| Use cylindrical coordinates.

- 7.** Evaluate  $\iiint_E \sqrt{x^2 + y^2} dV$ , where  $E$  is the region that lies inside the cylinder  $x^2 + y^2 = 16$  and between the planes  $z = -5$  and  $z = 4$ .
- 8.** Evaluate  $\iiint_E (x^3 + xy^2) dV$ , where  $E$  is the solid in the first octant that lies beneath the paraboloid  $z = 1 - x^2 - y^2$ .
- 9.** Evaluate  $\iiint_E e^z dV$ , where  $E$  is enclosed by the paraboloid  $z = 1 + x^2 + y^2$ , the cylinder  $x^2 + y^2 = 5$ , and the  $xy$ -plane.
- 10.** Evaluate  $\iiint_E x dV$ , where  $E$  is enclosed by the planes  $z = 0$  and  $z = x + y + 3$  and by the cylinders  $x^2 + y^2 = 4$  and  $x^2 + y^2 = 9$ .
- 11.** Evaluate  $\iiint_E x^2 dV$ , where  $E$  is the solid that lies within the cylinder  $x^2 + y^2 = 1$ , above the plane  $z = 0$ , and below the cone  $z^2 = 4x^2 + 4y^2$ .
- 12.** Find the volume of the solid that lies within both the cylinder  $x^2 + y^2 = 1$  and the sphere  $x^2 + y^2 + z^2 = 4$ .