

15.6 Surface Area

$$SA = \iint_R \sqrt{(f_x(x, y))^2 + (f_y(x, y))^2 + 1} \, dA$$

Example 1 Derive the surface area formula.

Example 2 Find the surface area of the function $z = \frac{2}{3}(x^{3/2} + y^{3/2})$ on the rectangle $[0, 1] \times [0, 1]$.

Example 3 Find the area of the surface $z = x^2 + y^2$ for $x^2 + y^2 \leq 9$.

Example 4 Find the surface $z^2 = x^2 + y^2$ over the triangle with vertices $(0, 0)$, $(4, 0)$, and $(0, 4)$.

Example 5 Find the surface area of the surface $z = \cos(x^2 + y^2)$ that lies above the cylinder $x^2 + y^2 = 1$. Simplify it down to a single interval and use Mathematica or your calculator to evaluate approximate the integral.