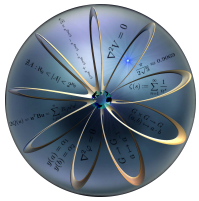

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example of integration with respect to surface area of a paraboloid

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In this example we examine the paraboloid given by the equation $z = x^2 + 3y^2$. Putting $g(x, y) = x^2 + 3y^2$, we have

$$\sqrt{1 + \left(\frac{\partial g}{\partial x}\right)^2 + \left(\frac{\partial g}{\partial y}\right)^2} = \sqrt{1 + (2x)^2 + (6y)^2} = \sqrt{1 + 4x^2 + 36y^2}$$

and hence

$$\int_S f(x, y)\, d^2A = \int f(x, y)\sqrt{1 + 4x^2 + 36y^2}\, dx\, dy.$$

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- http://planetmath.org/node/6669previous example
- http://planetmath.org/node/6673next example