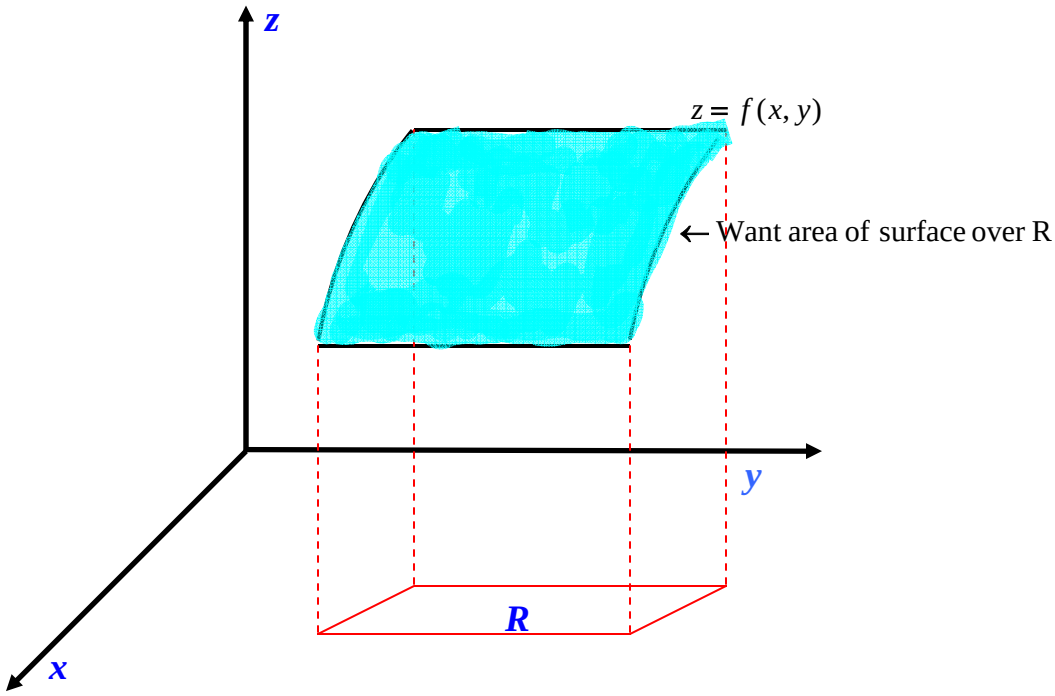
Section 12.6: Surface Area

Practice HW from Stewart Textbook (not to hand in)
p. 870 # 1, 2, 3, 5, 6, 11

Suppose we are given a surface $z = f(x, y)$ and want to find the area of its surface over a region R contained in the x-y plane.



This surface area can be calculated using the following double integral.

Formula For Calculating Surface Area

If the surface $z = f(x, y)$ and its first partial derivatives are continuous on the closed region R in the x-y plane, then

$$\text{Area of the Surface } z = f(x,y) \text{ over R} = \iint_R \sqrt{1 + [f_x(x,y)]^2 + [f_y(x,y)]^2}\, dA$$

Example 1: Find the area of the surface given by $-2x+3y+z=10$ over the region R given by the triangle with vertices (0, 0), (1, 0), and (0, 1).

Solution:

Example 2: Find the area of the surface given by $z = 4 + x^2 - y^2$ that lies within the cylinder $x^2 + y^2 = 9$

Solution: