# PS#24: More easy 2D areas!

*Nueva Multivariable Calculus*

Boy! All these higher-dimensional areas and volumes have been such a pain. Last week, we took a chill break from those septuple integrals to do an easy single integral, $\int_{-}^{+} e^{-x^2} dx$. Let's do some more easy single integrals that beget simple 2D areas!

(Do all these problems without looking up any advice or formulas or help!

1. What's the area of a rectangle with corners at the origin and $(5, 7)$? Or, phrased more complicatedly (for symmetry with the rest of the problems), consider the function:

$$f_1 : \mathbb{R}^2 \to \mathbb{R}^1$$

$$f_1(x, y) = 0$$

   What's the area of this function, above a rectangle with corners at the origin and at $(5, 7)$?

2. Consider the plane:

$$f_2 : \mathbb{R}^2 \to \mathbb{R}^1$$

$$f_2(x, y) = 2x + 3y + 10$$

   What's the area (as in, like, the one-sided surface area) of this function, above a rectangle with corners at the origin and at $(5, 7)$?

3. Consider the stretched-out parabola:

$$f_3 : \mathbb{R}^2 \to \mathbb{R}^1$$

$$f_3(x, y) = x^2$$

   What's the surface area of the function, above a rectangle with corners at the origin and at $(5, 7)$? (Again, by "surface area" here I just mean the area of one side, although if you feel compelled to double it, that doesn't fundamentally alter the problem.)

4. Consider the hyperbolic paraboloid:

$$f_4 : \mathbb{R}^2 \to \mathbb{R}^1$$

$$f_4(x, y) = x^2 - y^2$$

   Again, what's the area of this function, above a rectangle with corners at the origin and at $(5, 7)$?