I. BACK for a Moment to § 16.3 – p. 1038.

Problem #37. Sketch the region of integration and change the order of integration.

\[ \int_{x=0}^{x=4} \int_{y=0}^{y=\sqrt{x}} f(x,y) \, dy \, dx \]

\[ \int_{x=0}^{x=4} \int_{y=0}^{y=\sqrt{x}} f(x,y) \, dy \, dx = \int_{y=0}^{y=2} \int_{x=y^2}^{x=4} f(x,y) \, dx \, dy. \]

"As y = 0 to y = 2, x = y^2 to x = 4."

II. § 16.5 Apps of Dbl Int. p. 1045.

A. BASIC CONCEPTS.

1. Density = mass per unit volume.
2. Density function \( p(x,y) \) is continuous.
3. Lamina – in the xy plane

\[ \rho(x,y) = \lim_{\Delta A \to 0} \frac{\Delta m}{\Delta A} \]
4. mass of a lamina
\[ m = \iint_D \rho(x,y) \, dA \]

5. A moment is really a force \times distance
An element of moment

So the moment by resp. to the y-axis is
\[ x_i [\rho(x_i,y_i) \Delta A] \]

6.

A. The Moment about the y-axis
\[ M_y = \iint_D x \rho(x,y) \, dA \]

B. Similarly, the moment about the x-axis is
\[ M_x = \iint_D y \rho(x,y) \, dA. \]