

15.3, number 13: **Compute** $\int_0^6 \int_{y^2/3}^{2y} dx dy$. **This integral gives the area of a region. Draw the region.**

Answer: We drew the region on the next page. Here is the integral.

$$\begin{aligned} & \int_0^6 \int_{y^2/3}^{2y} dx dy \\ &= \int_0^6 x \Big|_{y^2/3}^{2y} dy \\ &= \int_0^6 (2y - y^2/3) dy \\ &= (y^2 - y^3/9) \Big|_0^6 \\ &= 36 - \frac{6^3}{9} \\ &= 36 - 6(4) \\ &= \boxed{12} \end{aligned}$$

Picture 15.3 Number 13

The integral $\int_0^6 \int_{\frac{y^2}{3}}^{2y} dx dy$ Finds the area of which region.

The region is described by: for each fixed y with $0 \leq y \leq 6$

x goes from $x = \frac{y^2}{3}$ to $x = 2y$

$x = \frac{y^2}{3}$ is a parabola "on its side"

$x = 2y$ is a line

both curves pass through $(0,0)$ and $(12,6)$. The parabola is above the line

