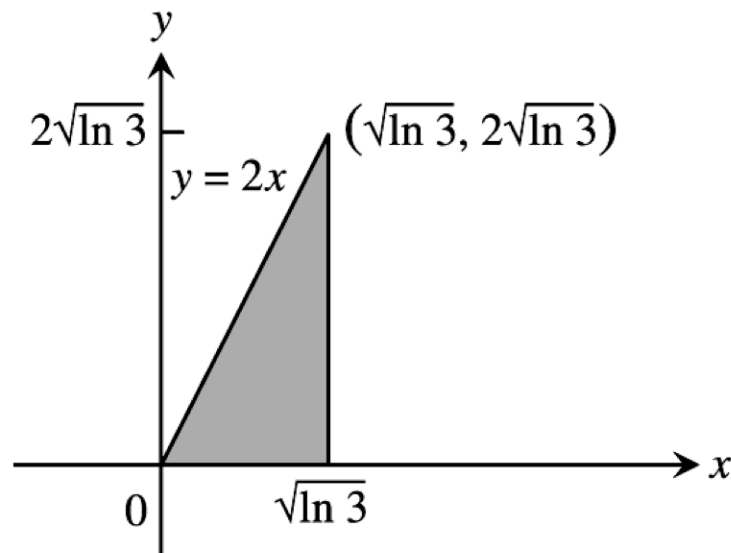


Name: \_\_\_\_\_

## QUIZ 1 SOLUTION

Sketch the region of integration, reverse the order of integration, and evaluate the integral:

$$\int_0^{2\sqrt{\ln 3}} \int_{y/2}^{\sqrt{\ln 3}} e^{x^2} dx dy$$



Any vertical line through the region enters at  $y = 0$  and leaves at  $y = 2x$ . The smallest  $x$  is 0 and the largest is  $\sqrt{\ln 3}$ . So the integral can be written

$$\int_0^{\sqrt{\ln 3}} \int_0^{2x} e^{x^2} dy dx.$$

To evaluate it,

$$\begin{aligned} \int_0^{\sqrt{\ln 3}} \int_0^{2x} e^{x^2} dy dx &= \int_0^{\sqrt{\ln 3}} \left[ ye^{x^2} \right]_{y=0}^{y=2x} dx \\ &= \int_0^{\sqrt{\ln 3}} 2xe^{x^2} dx = \int_0^{\ln 3} e^u du \\ &= [e^u]_0^{\ln 3} = 3 - 1 = 2. \end{aligned}$$