

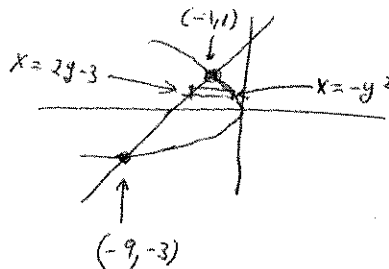
PRINT Your Name: \_\_\_\_\_

**Quiz 14 — September 29, 2015**

**Remove everything from your desk except this page and a pencil or pen.**  
The solution will be posted soon after the quiz is given.

**Find the area bounded by  $x + y^2 = 0$  and  $2y = x + 3$ . You must draw a meaningful picture.**

The graph of  $x + y^2 = 0$  is a parabola with vertex at the origin and opening to the left. The graph of  $2y = x + 3$  is the line through  $(0, \frac{3}{2})$  and  $(-3, 0)$ . These two curves intersect when  $(2y - 3) + y^2 = 0$ ; so  $y^2 + 2y - 3 = 0$  or  $(y + 3)(y - 1) = 0$ . The intersection occurs when  $y = -3$  or  $y = 1$ . The points of intersection are  $(-1, 1)$  and  $(-9, -3)$ . The picture is



We chop the  $y$ -axis from  $-3$  to  $1$ . The area is

$$\begin{aligned} \int_{-3}^1 (-y^2 - (2y - 3)) dy &= \int_{-3}^1 (-y^2 - 2y + 3) dy = \left. \frac{-y^3}{3} - y^2 + 3y \right|_{-3}^1 \\ &= \frac{-1}{3} - 1 + 3 - (9 - 9 - 9) = \boxed{\frac{32}{3}}. \end{aligned}$$