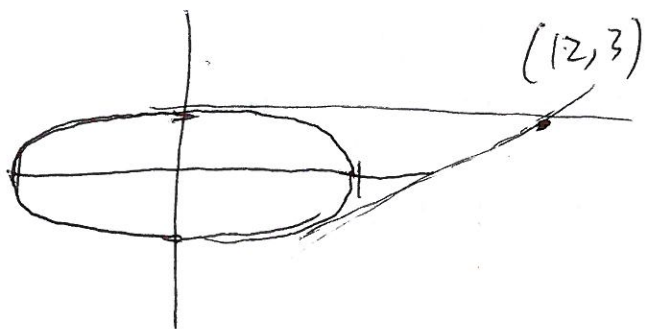


3.5  
#54

Ellipse

$$x^2 + 4y^2 = 36$$



$$\frac{d}{dx}[x^2 + 4y^2] = \frac{d}{dx}[36]$$

$$2x + 8y \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{-x}{4y}$$

let's call the  $x$  value  
of one of our two  
points  $x'$  and the  
 $y$  value  $y'$

$\frac{3-y}{12-x}$  should be  
the slope  
of our line

but we should  
get the same  
slope from  $\frac{dy}{dx}$

$$\frac{-x}{4y} = \frac{3-y}{12-x}$$

$$-x(12-x) = 4y(3-y)$$

See other side

once we get  
our points

$(0, 3)$  and  $(4.8, -1.8)$

~~we~~

we need an  
equation connecting

$(0, 3) \rightarrow (12, 3)$

and  $(4.8, -1.8) \rightarrow (12, 3)$

$$-X(12-X) = 4Y(3-Y)$$

$$-12X + X^2 = 12Y - 4Y^2$$

$$-12X + X^2 - 12Y + 4Y^2 = 0$$

$$\text{also } X^2 + 4Y^2 = 36$$

$$X = \sqrt{36 - 4Y^2}$$

$$-12\sqrt{36-4Y^2} + (\sqrt{36-4Y^2})^2 - 12Y + 4Y^2 = 0$$

$$12\sqrt{36-4Y^2} - (36 - 4Y^2) + 12Y - 4Y^2 = 0$$

$$12\sqrt{36-4Y^2} + 12Y - 36 = 0$$

$$\sqrt{36-4Y^2} + (Y-3) = 0$$

$$(\sqrt{36-4Y^2} + (Y-3))(\sqrt{36-4Y^2} - (Y-3)) = 0$$

$$(36 - 4Y^2) - (Y-3)^2 = 0$$

$$36 - 4Y^2 - (Y^2 - 6Y + 9) = 0$$

$$-5Y^2 + 6Y + 27 = 0$$

$$Y = \frac{-6 \pm \sqrt{36 - 4(-5)(27)}}{2(-5)} = \frac{-6 \pm \sqrt{36 + 540}}{-10} = \frac{-6 \pm \sqrt{576}}{-10} = \frac{-6 \pm 24}{-10}$$

$$X^2 + 4Y^2 = 36$$

$$X^2 + 4(-1.8)^2 = 36$$

$$X = \sqrt{36 - 4(-1.8)^2}$$

$$= 4.8$$

$$X^2 + 4(3)^2 = 36$$

$$X = 0$$