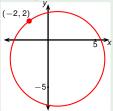
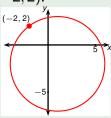
Calculus I Tangent to implicit curve, part 2

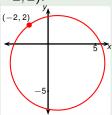
Todor Milev

2019

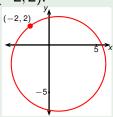




Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:



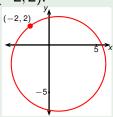
Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:
 $\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$
+?



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

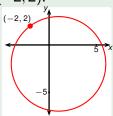
$$2(x-1) \frac{d}{dx} (x-1) + ? = ?$$



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

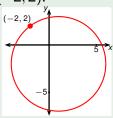
$$2(x-1)\frac{d}{dx}(x-1) + ? = ?$$



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

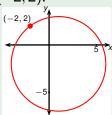
$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = ?$$



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

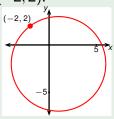
$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = ?$$



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

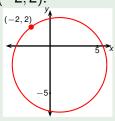


Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1) \frac{d}{dx} (x-1) + 2(y+2) \frac{d}{dx} (y+2) = 0$$

$$2(x-1)(?) + 2(y+2) (?) = 0$$

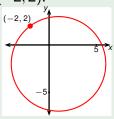


Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2) (?) = 0$$

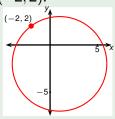


Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2) (?) = 0$$

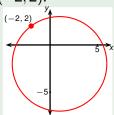


Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2) \left(\frac{dy}{dx}\right) = 0$$



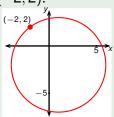
Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

$$2(x-1) \frac{d}{dx} (x-1) + 2(y+2) \frac{d}{dx} (y+2) = 0$$

$$2(x-1)(1) + 2(y+2) \left(\frac{dy}{dx} \right) = 0$$

$$2(y+2) \left(\frac{dy}{dx} \right) = 2(1-x)$$



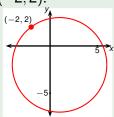
Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2)\left(\frac{dy}{dx}\right) = 0$$

$$2(y+2)\left(\frac{dy}{dx}\right) = 2(1-x)$$



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

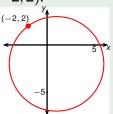
$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2) \left(\frac{dy}{dx} \right) = 0$$

$$2(y+2) \left(\frac{dy}{dx} \right) = 2(1-x)$$

$$\frac{dy}{dx} = \frac{1-x}{y+2}$$



Plug in
$$(-2,2)$$
:

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{1 - (-2)}{2 + 2}$$

Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

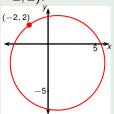
$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

$$2(x-1) \frac{d}{dx} (x-1) + 2(y+2) \frac{d}{dx} (y+2) = 0$$

$$2(x-1)(1) + 2(y+2) \left(\frac{dy}{dx} \right) = 0$$

$$2(y+2) \left(\frac{dy}{dx} \right) = 2(1-x)$$

$$\frac{dy}{dx} = \frac{1-x}{y+2}$$



Plug in
$$(-2, \frac{2}{2})$$
:

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{1 - (-2)}{2 + 2}$$

Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

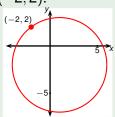
$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2) \left(\frac{dy}{dx} \right) = 0$$

$$2(y+2) \left(\frac{dy}{dx} \right) = 2(1-x)$$

$$\frac{dy}{dx} = \frac{1-x}{y+2}$$



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} \left((x-1)^2 \right) + \frac{d}{dx} \left((y+2)^2 \right) = \frac{d}{dx} (25)$$

$$2(x-1)\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

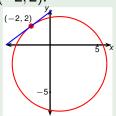
$$2(x-1)(1) + 2(y+2)\left(\frac{dy}{dx}\right) = 0$$

$$2(y+2)\left(\frac{dy}{dx}\right) = 2(1-x)$$

Plug in
$$(-2,2)$$
:

$$\frac{dy}{dx} = \frac{1 - (-2)}{2 + 2} = \frac{3}{4}$$

Find an equation of the tangent line to $(x-1)^2 + (y+2)^2 = 25$ at (-2,2).



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1) \frac{d}{dx} (x-1) + 2(y+2) \frac{d}{dx} (y+2) = 0$$

Plug in
$$(-2, 2)$$
:

$$\frac{dy}{dx} = \frac{1 - (-2)}{2 + 2} = \frac{3}{4}$$

Point-slope form:

$$y-\frac{2}{4}=\frac{3}{4}(x+2)$$

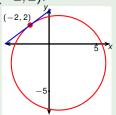
$$\frac{dx}{dx}(x-1) + 2(y+2)\frac{dy}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2)\left(\frac{dy}{dx}\right) = 0$$

$$2(y+2)\left(\frac{dy}{dx}\right) = 2(1-x)$$

$$\frac{dy}{dx} = \frac{1-x}{y+2}$$

Find an equation of the tangent line to $(x-1)^2 + (y+2)^2 = 25$ at (-2,2).



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1) \frac{d}{dx} (x-1) + 2(y+2) \frac{d}{dx} (y+2) = 0$$

Plug in
$$(-2,2)$$
:

$$\frac{dy}{dx} = \frac{1 - (-2)}{2 + 2} = \frac{3}{4}$$

Point-slope form:

$$y-2=\frac{3}{4}(x+2)$$

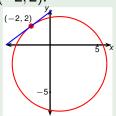
$$\frac{dx}{dx}(x-1) + 2(y+2)\frac{dy}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2)\left(\frac{dy}{dx}\right) = 0$$

$$2(y+2)\left(\frac{dy}{dx}\right) = 2(1-x)$$

$$\frac{dy}{dx} = \frac{1-x}{y+2}$$

Find an equation of the tangent line to $(x-1)^2 + (y+2)^2 = 25$ at (-2,2).



Find
$$\frac{dy}{dx}$$
, given $(x-1)^2 + (y+2)^2 = 25$:

$$\frac{d}{dx} ((x-1)^2) + \frac{d}{dx} ((y+2)^2) = \frac{d}{dx} (25)$$

$$2(x-1) \frac{d}{dx} (x-1) + 2(y+2) \frac{d}{dx} (y+2) = 0$$

Plug in
$$(-2, 2)$$
:

$$\frac{dy}{dx} = \frac{1 - (-2)}{2 + 2} = \frac{3}{4}$$

Point-slope form:

$$y-2=\frac{3}{4}(x+2)$$

$$\frac{d}{dx}(x-1) + 2(y+2)\frac{d}{dx}(y+2) = 0$$

$$2(x-1)(1) + 2(y+2)\left(\frac{dy}{dx}\right) = 0$$

$$2(y+2)\left(\frac{dy}{dx}\right) = 2(1-x)$$

$$\frac{dy}{dx} = \frac{1-x}{y+2}$$