

Week 7 Friday Homework (1323493)

Question 12345678910111213141516

1. Question DetailsSCalcET6 3.5.AE.01. [1290271]

[Video Example](#) [Online Textbook](#)**EXAMPLE 1** (a) If $x^2 + y^2 = 400$, find dy/dx .(b) Find an equation of the tangent line to the circle $x^2 + y^2 = 400$ at the point $(-12, 16)$.**SOLUTION** (a) Differentiating both sides of the equation $x^2 + y^2 = 400$:

$$\frac{d}{dx} (\text{ }) = \frac{d}{dx} (\text{ })$$

$$\frac{d}{dx} (\text{ }) + \frac{d}{dx} (\text{ }) = \text{ }$$

Remembering that y is a function of x and using the Chain Rule, we have

$$\frac{d}{dx} y^2 = \frac{d}{dy} (\text{ }) \frac{dy}{dx} = (\text{ }) \frac{dy}{dx}$$

Thus

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

Now we solve this equation for dy/dx :

$$\frac{dy}{dx} = \frac{\text{ } - \text{ } }{\text{ } }$$

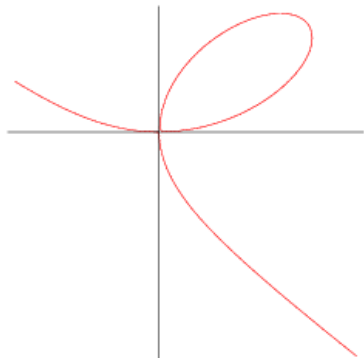
(b) An equation of the tangent to the circle at $(-12, 16)$ is therefore


$$y - (\text{ }) = (\text{ }) (x - (\text{ }))$$

$$\text{or } (\text{ })x + (\text{ })y = 400$$

2. Question DetailsSCalcET6 3.5.Tut.01. [657317]

3. Question DetailsSCalcET6 3.5.AE.02. [1291065]



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- EXAMPLE 2** (a) Find y' if $x^3 + y^3 = 6xy$.
 (b) Find the tangent to the folium of Descartes $x^3 + y^3 = 6xy$ at the point $(3, 3)$.
 (c) At what points in the first quadrant is the tangent line horizontal?

SOLUTION (a) Differentiating both sides of $x^3 + y^3 = 6xy$ with respect to x , regarding y as a function of x , and using the Chain Rule of the y^3 and the Product Rule on the term $6xy$, we get

$$3x^2 + 3(\text{ })y' = 6(\text{ })y' + 6(\text{ })$$

$$x^2 + (\text{ })y' = 2(\text{ })y' + 2(\text{ })$$

We now solve for y' :

$$y^2y' - 2xy' = 2y - x^2$$

$$(\text{ })y' = 2y - x^2$$

$$= \frac{2y - x^2}{\text{ }}$$

- (b) When $x = y = 3$,

$$y' = \frac{\text{ }}{\text{ }} = -1$$

and a glance at the figure to the left confirms that this is a reasonable value for the slope at $(3, 3)$. So an equation of the tangent to the folium at $(3, 3)$ is

$$y - \text{ } = -1(x - \text{ })$$

$$\text{or } x + y = \text{ }$$

- (c) The tangent line is horizontal if $y' = \text{ }$. Using the expression for y' from part (a), we see that $y' = 0$ when

$\text{ } = 0$ (provided that $y^2 - 2x \neq 0$). Substituting $x^2/2$ in the equation of the curve, we get

$$x^3 + (\text{ })^3 = 6x(\text{ })$$

which simplifies to $x^6 =$

 . Since $x \neq 0$ in the first quadrant, we have $x^3 = \text{ }$. If $x = (\text{ })^{1/3} = \text{ } \sqrt[3]{\text{ }}$, then $y = 1/2 \text{ } \text{ }$. Thus the tangent is horizontal at $(0, 0)$ and at approximately $(\text{ }, \text{ })$. Looking at the figure, we see that our answer is reasonable.

4. Question DetailsSCalcET6 3.5.Tut.02. [657207]

5. Question DetailsSCalcET6 3.5.002. [1291536]

You are given the following equation.

$$4x^2 + 9y^2 = 36$$

(a) Find dy/dx by implicit differentiation.

$$dy/dx = \boxed{}$$

(b) Solve the equation explicitly for y and differentiate to get dy/dx in terms of x . (Consider only the first and second quadrants for this part.)

$$dy/dx = \boxed{}$$

(c) Check that your solutions to parts (a) and (b) are consistent by substituting the expression for y into your solution for part (a). (Do this on paper. Your teacher may ask you to turn in this work.)

6. Question DetailsSCalcET6 3.5.003. [1291663]

Find y' by implicit differentiation.

$$\frac{2}{x} + \frac{2}{y} = 3$$

$$y' = \boxed{}$$

7. Question DetailsSCalcET6 3.5.006. [1291718]

Find dy/dx by implicit differentiation.

$$5\sqrt{x} + \sqrt{y} = 1$$

$$dy/dx = \boxed{}$$

8. Question DetailsSCalcET6 3.5.007. [1291020]

Find dy/dx by implicit differentiation.

$$5x^2 + 3xy - y^2 = 9$$


$$dy/dx = \boxed{}$$

9. Question DetailsSCalcET6 3.5.021. [807175]

If $f(x) + x^2[f(x)]^5 = 246$ and $f(1) = 3$, find $f'(1)$.

$$f'(1) = \boxed{}$$

10. Question DetailsSCalcET6 3.5.AE.05. [1291475]

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EXAMPLE 5

Differentiate (a) $y = \frac{1}{\arcsin(5x)}$ and (b) $f(x) = 2x \arctan(\sqrt{x})$

SOLUTION

$$\begin{aligned} \text{(a)} \quad \frac{dy}{dx} &= \frac{d}{dx} \left(\boxed{} \right)^{-1} \\ &= - \left(\boxed{} \right)^{-2} \frac{d}{dx} \left(\boxed{} \right) \\ &= \frac{\boxed{}}{\left(\boxed{} \right)^2 \sqrt{}} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad f'(x) &= \frac{2x}{\boxed{}} + \left(\boxed{} \right)^2 \left(\boxed{} \right) + \boxed{} \arctan(\sqrt{x}) \\ &= \frac{2(1 + \boxed{})}{\boxed{}} + \boxed{} \arctan(\sqrt{x}) \end{aligned}$$

11. Question DetailsSCalcET6 3.5.045. [1291480]

Find the derivative of the following function. Simplify where possible.

$$y = 19 \arctan(\sqrt{x})$$

$$y' = \boxed{}$$


12. Question DetailsSCalcET6 3.5.053. [1291069]

Find the derivative of the function. Simplify if possible.

$$y = \arccos(e^{7x})$$

$$y' = \boxed{}$$

13. Question DetailsSCalcET6 3.6.AE.01. [1290983]

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EXAMPLE 1 Differentiate $y = \ln(x^5 + 2)$

SOLUTION To use the Chain Rule, we let $u = x^5 + 2$. Then $y = \ln u$, so

$$\begin{aligned} \frac{dy}{dx} &= \frac{dy}{du} \frac{du}{dx} = \boxed{} \frac{du}{dx} \\ &= \frac{1}{x^5 + 2} \left(\boxed{} \right) \\ &= \frac{\boxed{}}{x^5 + 2} \end{aligned}$$

14. Question DetailsSCalcET6 3.6.002. [1291018]

Differentiate the function.

$$f(x) = \ln(x^3 + 10)$$

$$f'(x) = \boxed{}$$

15. Question DetailsSCalcET6 3.6.004. [1290150]

Differentiate the function.

$$f(x) = \ln(4(\sin(x))^2)$$

$$f'(x) = \boxed{}$$

16. Question DetailsSCalcET6 3.6.009. [1291404]

Differentiate the function.

$$f(x) = \sin(x) \ln(4x)$$

$$f'(x) = \boxed{}$$

Assignment Details

Name (AID): **Week 7 Friday Homework (1323493)**

Submissions Allowed: **5**

Category: **Homework**

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Author: **Jernigan, John** (jjernigan@ccp.edu)

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