Name _____ Period _____ Date _____

Assignment #15A: *Implicit Differentiation Practice*

1. Graph the equation $x^2 + y^2 = 25$. Find the derivative when $x = 3$. Find the tangent line(s) to the graph at $x = 3$. *Do not solve for y when solving for the derivative.*

2. Find $\dfrac{dy}{dx}$ if $2x^2 + 3y^2 = 7$.

3. Find $\dfrac{dy}{dx}$ if $x^3 + y^3 = 6xy$. Find the equation of the tangent line at $(3,3)$.

4. Find $\dfrac{dy}{dx}$ if $x^2 - xy + y^2 = 7$.

5. Find $\dfrac{dy}{dx}$ if $2x^3 - 3y^2 = 7$.

Two functions, *f* and *g*, are continuous and differentiable for all real numbers. Some values of the functions and their derivatives are shown in this table:

6. Find $\dfrac{d}{dx}\left[f\left(g\left(x\right)\right) \right]$ at $x = 3$

x	0	1	2	3	4
$f(x)$	$\dfrac{1}{2}$	$\dfrac{1}{3}$	1	−1	3
$g(x)$	−2	1	$-\dfrac{1}{2}$	2	$-\dfrac{1}{3}$
$f'(x)$	$\dfrac{3}{2}$	$\dfrac{5}{3}$	$\dfrac{1}{4}$	0	$-\dfrac{4}{5}$
$g'(x)$	−1	$\dfrac{2}{3}$	−4	−3	$-\dfrac{1}{3}$

7. Find $\dfrac{d}{dx}\left[g\left(f\left(x\right)\right) \right]$ at $x = 4$

8. Find $\dfrac{d}{dx}\left[f\left(g\left(x\right)\right) \right]$ at $x = 1$

9. Find $\dfrac{d}{dx}\left[g\left(f\left(x\right)\right) \right]$ at $x = 2$

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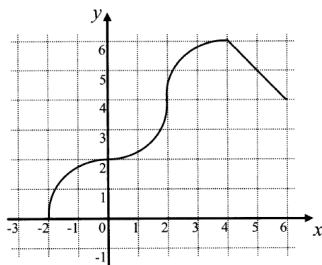
10. What is the slope of the tangent line to the ellipse with equation $x^2 - xy + y^2 = 21$ at the point (1, 5)?

    (A) $-\dfrac{7}{9}$ (B) $-\dfrac{2}{9}$ (C) $\dfrac{1}{3}$ (D) $\dfrac{24}{9}$ (E) 7

11. For what values of x is $f(x) = \dfrac{(x-1)^{\frac{2}{3}}}{x+2}$ not differentiable?

    (A) 1 only   (B) –2 only   (C) –2 and 1 only

    (D) –2, 1, and 7 only   (E) ±1 and ±2 only

12.

The graph of $y = f(x)$ above consists of three quarter circles and a line segment. For which values of x in the open interval $(-2, 6)$ is f not differentiable?

    (A) 0 only   (B) 2 only   C) 0 and 2 only

    (D) 2 and 4 only   (E) 0, 2, and 4

In addition, sketch the derivative of the function in problem 12.

13. If $x + 2xy - y^2 = 2$, then at the point $(1,1)$, $\dfrac{dy}{dx}$ is

    (A) $\dfrac{3}{2}$ (B) $\dfrac{1}{2}$ (C) 0   (D) $-\dfrac{3}{2}$ (E) nonexistent

14. An equation of the line tangent to the graph of $f(x) = x(1-2x)^3$ at the point $(1,-1)$ is

    (A) $y = -7x + 6$ (B) $y = -6x + 5$ (C) $y = -2x + 1$

    (D) $y = 2x - 3$ (E) $y = 7x - 8$

15. A particle moves along the x-axis so that at any time $t \geq 0$ its position is given by $x(t) = t^3 - 3t^2 - 9t + 1$. For what values of t is the particle at rest?

    (A) No values   (B) 1 only   (C) 3 only   (D) 5 only   (E) 1 and 3

16. If $f(x) = \sqrt{2x}$, then $f'(2) =$

    (A) $\dfrac{1}{4}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{\sqrt{2}}{2}$ (D) 1   (E) $\sqrt{2}$