PM - Calculus

Differentiation - Extra Practice

Name _____ Teacher _____

1. What is the average rate of change over $2 \leq t \leq 4$?

t	2	3	4	5	6
$f(t)$	1.8	3.4	4.6	6.4	8.4

2. The table shows the position of an object moving along a line at 6 second intervals.

   What is the average velocity, in units/sec, over $6 \leq t \leq 12$?

$t(sec)$	0	6	12	18	24
position	40	38	35	30	18

3. The position of an object is given by $s = t^2 + 5t - 20$. What is its average velocity for $1 \leq t \leq 3$?

4. The position of an object is given by $s = t^2 - 8t + 1$. What is its average velocity over the time interval $[3, 3 + t]$?

5. Given the position function $s = t^3 - 2t + 5$, what is the instantaneous rate of change at $t = 3$?

6. Given the position function $F(x) = x^3 - 2x^2 + 1$, what is the instantaneous rate of change of F?

7. If $f(x) = 5x^3$, then $f'(2) =$

8. If $f(x) = \sin x$, then $f'(\frac{\pi}{6}) =$

9. If $f(x) = \sin^4 x$, then $f'(\frac{\pi}{3}) =$

10. If $f(x) = \sin x \cos x$, then $f'(\frac{\pi}{6}) =$

11. If $f(x) = \sqrt{3} + \cos x - (3\pi x)$, then $f'\left(\frac{\pi}{3}\right) =$

12. Given $f(x) = \dfrac{x}{\tan x}$, find $f'\left(\frac{\pi}{2}\right)$.

13. If $f(x) = \dfrac{3x}{\cos x}$, then $f'(2.014) \approx$

14. If $f(x) = (2x^3 + 5x^2 - 7x + 4)(4x^2 - 5x + 2)$, then find $f'(1)$.

15. Given $f(x) = e^{\sqrt{2x}}$, find $f'(2)$.

16. If $f(x) = x \ln x^2$ then $f'(e) =$

17. If $f(x) = x^2 \ln x$ then $f'(e) =$

18. Find the slope of the tangent line to the graph of $f(x) = 2x(2x^2 - 1)$ at the point where $x = 1$.

19. Find an equation of the tangent line to the graph of $f(x) = \frac{(x-3)}{(x+3)}$ when $x = -2$.

20. Write an equation of the tangent line to the graph of $f(x) = x^4 - x^2$ at the point where $x = 1$.

21. Find the equation of a tangent line to $f(x) = xe^x$ when $x = 1$.

22. Find the slope of the tangent line to the graph of $y = (\ln x)e^x$ at the point where $x = 2$.

23. Find the slope of the tangent line to the graph of $y = \ln x^4$ at the point where $x = e^3$.

24. Find the derivative of $y = (x^2 + 2x + 5)^6$.

25. Find the derivative of $y = \sqrt[3]{3x^2 + 2x}$.

26. Find $\frac{dy}{dx}$ for $y = \sqrt{x}(3x - 1)$.

27. Find the derivative: $s(t) = \cos\left(\frac{t}{3}\right)$

28. Find the derivative of $y = \cos x^3$.

29. Find the derivative of $y = \cos(x^3 - \frac{\pi}{6})$.

30. Find $f'(x)$ given $f(x) = \cos^4(3x)$.

31. If $x = y + 3y^2 + 4y^3$, then $y' =$

32. Given $2x = xy + y^2$, then $\frac{dy}{dx} =$

33. Find y' given $x^2 + y^2 = 2xy$.

34. If $x^2y + 9y^2 = 3 - x$ then $\frac{dy}{dx} =$

35. Find $\frac{dy}{dx}$ given $x = \sin(x + y)$.

36. What is the slope of the tangent line to $x^2y + xy^2 = 12$ at the point $(1, 3)$?

37. Given a curve defined by $y(3x^2 + y^2) = -13$, find $\frac{dy}{dx}$.

38. What is the slope of the tangent line to $xy + \ln 2x = \frac{1}{2}$ at the point $(\frac{1}{2}, 1)$?

PM - Calculus Differentiation - Extra Practice Prof. Singh 12/10/2013

1.
Answer: 1.4

2.
Answer: -0.833

3.
Answer: 9

4.
Answer: $-2 + t$

5.
Answer: 25

6.
Answer: $3x^2 - 4x$

7.
Answer: 60

8.
Answer: $\frac{\sqrt{3}}{2}$

9.
Answer: $\dfrac{3\sqrt{3}}{4}$

10.
Answer: $\frac{1}{2}$

11.
Answer: $-\frac{\sqrt{3}}{2} - 3\pi$

12.
Answer: undefined

13.
Answer: 22.685

14.
Answer: 21

15.
Answer: $\dfrac{e^2}{2}$

16.
Answer: 4

17.
Answer: $3e$

18.
Answer: 10

19.
Answer: $y + 5 = 6(x + 2)$

20.
Answer: $y = 2x - 2$

21.
Answer: $2ex - y - e = 0$

22.
Answer: $e^2(\ln 2 + \frac{1}{2})$

23.
Answer: $\dfrac{4}{e^3}$

24.
Answer: $6(2x + 2)(x^2 + 2x + 5)^5$

25.
Answer: $\dfrac{1}{3}(3x^2 + 2x)^{-2/3}(6x + 2)$

26.
Answer: $\dfrac{9x - 1}{2\sqrt{x}}$

27.
Answer: $-\dfrac{1}{3}\sin\left(\dfrac{t}{3}\right)$

28.
Answer: $-3x^2 \sin x^3$

29.
Answer: $-3x^2 \sin(x^3 - \frac{\pi}{6})$

30.
Answer: $-12 \sin 3x \cos^3(3x)$

31.
Answer: $\dfrac{1}{1 + 6y + 12y^2}$

32.
Answer: $\dfrac{(2 - y)}{x + 2y}$

33.
Answer: 1

34.
Answer: $\dfrac{-2xy - 1}{x^2 + 18y}$

35.
Answer: $\dfrac{1 - \cos(x + y)}{\cos(x + y)}$

36.
Answer: $-\frac{15}{7}$

37.
Answer: $\frac{-2xy}{(x^2+y^2)}$

38.
Answer: -6