Unit 2 - End of Unit Review

Calc. AB/BC

Warmup: Questions from CA1 - Lesson 2.10?

If you haven’t finished the CA worksheet from yesterday take it out and continue to work on it during this time.

Name: ______________________________ Date:______________ Period: _____

Review

Unit 2 Review – Differentiation: Definition & Fundamental Properties

Reviews do NOT cover all material from the lessons but will hopefully remind you of key points. To be prepared, you should review all packets from Unit 2.

Find the average rate of change of each function on the given interval. Use appropriate units if necessary.

1. $w(x) = \ln x;\quad 1 \leq x \leq 7$

2. $s(t) = -t^2 - t + 4;\ [1,5]$
   t represents seconds
   s represents feet

3. Find the derivative of $y = 2x^2 + 3x - 1$ by using the definition of the derivative. $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$

4. For the function $h(t)$, h is the temperature of the oven in Fahrenheit, and t is the time measured in minutes.

   a. Explain the meaning of the equation $h(15) = 420$.

   b. Explain the meaning of the equation $h'(43) = -11$.

Find the derivative of each function.

5. $f(x) = 4 - \frac{1}{2x^2}$

6. $g(x) = 3\sqrt{x} - \frac{6}{x^2} + 5\pi^3$

7. $h(x) = 4e^x - 2\cos x$

8. $s(t) = t^2 \sin(t)$

9. $d(t) = 3\sqrt{t}\ln t$

10. $y = \frac{4}{x} - \sec x$

11. $h(x) = \frac{2-x}{x+2}$

Find the equation of the tangent line of the function at the given *x*-value.

12. $f(x) = -2x^3 + 3x$ at $x = -1$.

13. $f(x) = 4\sin x - 2$ at $x = \pi$

14. Find the equation for the normal line of $y = \frac{1}{2}x^2 + \frac{3}{4}x - 4$ at $x = -3$

15. If $f(x) = 3\sin x - 2e^x$ find $f'(0)$. No calculator!

A calculator is allowed on the following problems.

16. If $f(x) = x\sin(3x^2 - 2)$; find $f'(7)$.

17. If $f(x) = \csc(3x)$ at $x = 2$.

18. Use the table below to estimate the value of $d'(120)$. Indicate units of measures.

t seconds	2	13	60	180	500
$d(t)$ feet	10	81	412	808	2,105

19. Is the function differentiable at $x = 2$?

$$f(x) = \begin{cases} 3x - 3x^2 - 5, & x < 2 \\ 7 - 9x, & x \geq 2 \end{cases}$$

20. What values of a and b would make the function differentiable at $x = 4$?

$$f(x) = \begin{cases} a\sqrt{x} + bx^2 - 1, & x < 4 \\ \dfrac{16}{x} + bx, & x \geq 4 \end{cases}$$

Notes Filled In:

AP Calc. AB/BC - End of Unit Review (2) - Filled In

Name: ________________________________ Date:_______________

Corrective Assignment

Unit 2 CA – Differentiation: Definition & Fundamental Properties

Find the average rate of change of each function on the given interval. Use appropriate units if necessary.

1. $s(t) = \frac{1}{t-3}$; $[0, 1]$
   s represents miles
   t represents seconds

Use the following table to find the average rate of change on the given interval.

t (item)	2	60	100	200	500
$p(t)$ (dollars)	−7,000	−100	350	900	2,500

2. $[60, 500]$

3. $2 \leq t \leq 100$

Each limit represents the instantaneous rate of change of a function. Identify the original function, and the *x*-value of the instantaneous rate of change.

4. $\lim_{x \to 4} \frac{(x^2-3x)-(4)}{x-4}$

Function: $f(x) =$

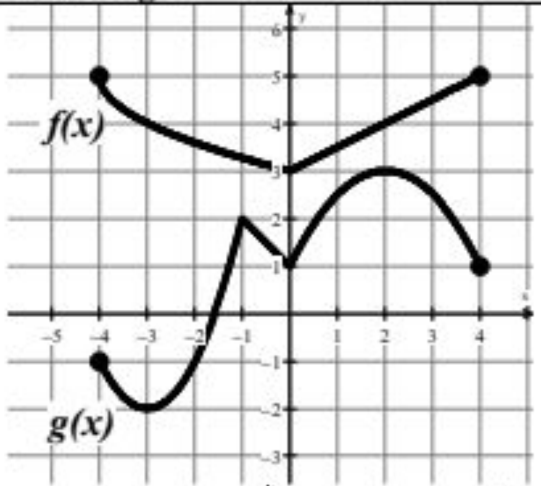
Instantaneous rate at $x =$

5. $\lim_{h \to 0} \frac{9(5+h)-10(5+h)^2+(205)}{h}$

Function: $f(x) =$

Instantaneous rate at $x =$

Use the graphs of f and g to find the following.



6. $h(x) = f(g(x))$. Find the average rate of change on the interval $[2,4]$.

7. $j(x) = g(f(x))$. Find the average rate of change on the interval $[-3,2]$.

Use the table to find the value of the derivatives of each function.

8.

x	$h(x)$	$h'(x)$	$r(x)$	$r'(x)$
-2	-3	2	-2	4

a. $f(x) = -h(x)r(x)$
Find $f'(-2)$.

b. $g(x) = \frac{h(x)+r(x)}{r(x)}$
Find $g'(-2)$.

c. $w(x) = \left(4 - 2h(x)\right)\left(1 - r(x)\right)$
Find $w'(-2)$.

9. $S(x)$ is the number of students in Mr. Kelly's class and x is the number of years since 2015.

a. Explain the meaning of $S(3) = 127$.

b. Explain the meaning of $S'(3) = 4$.

Find the value of the derivative at the given point. Round or truncate to three decimal places.

10. $f(x) = \frac{x}{\sqrt{3x-5}}$ at $x = 5$.

11. $f(x) = \tan^2 x$ at $x = -2$.

12. Use the tables to estimate the value of $f'(45)$. Indicate units of measures.

t minutes	20	30	60	65	75
$v(t)$ feet per minute	100	207	455	501	606

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Find the derivative of each function.		
13. $s(t) = 7\sin t - 3\ln t - 5e^t$	14. $f(x) = 7x^3 - 4x^2 + x - 3$	15. $f(x) = \frac{x^2}{\cos x}$
16. $y = \sqrt{x} - \cot x$	17. $d(t) = (4 - t)\cos t$	18. $g(x) = \frac{x^4 - 3x^2 + 6x}{x^2}$

19. $g(x) = 4x^3 e^x$

20. $h(x) = 8\sqrt{x} - \frac{5}{x^4} + \pi^2$

21. $g(x) = \frac{3}{4}x^{-1} - \frac{1}{2}\sqrt{x}$

22. At what x-value(s) does the function $f(x) = \frac{x^4}{4} - 3x^3 + 9x^2 + 7$ have a horizontal tangent?

23. If $f(x) = \cos x + \sin x$, find $f'\left(\frac{\pi}{3}\right)$

Find the equation for the tangent line to the function at the given value of x.

24. $f(x) = 6\sqrt{x} + \frac{4}{x} - 1$ at $x = 4$

25. $f(x) = 2e^x + \cos x$ at $x = 0$

26. Is the function differentiable at $x = -1$? $f(x) = \begin{cases} 3x^4 + 9x - 6, & x < -1 \\ \frac{2}{x} - x - 11, & x \geq -1 \end{cases}$

27. What values of a and b would make the function differentiable at $x = 2$?

$$f(x) = \begin{cases} ax^3 + 2x + 1, & x < 2 \\ 2 - bx, & x \geq 2 \end{cases}$$

Unit 2 Corrective Assignment – Answers

1. $-\frac{1}{6}$ miles / sec	2. 5.909 dollars / item	3. 75 dollars / item	
4. $f(x) = x^2 - 3x$ at $x = 4$	5. $f(x) = 9x - 10x^2$ at $x = 5$	6. $-\frac{1}{2}$	
7. 0	8a. 16	8b. 2	8c. -52
9a. In 2018, there are 127 students in Mr. Kelly's class.			
9b. In 2018, the number of students Mr. Kelly teaches is increasing by 4 students per year.	10. 0.079	11. 25.2348	12. 8.2666 ft per min^2
13. $7\cos t - \frac{3}{t} - 5e^t$	14. $21x^2 - 8x + 1$	15. $\frac{2x\cos x + x^2 \sin x}{\cos^2 x}$	
16. $\frac{1}{2\sqrt{x}} + \csc^2 x$	17. $-\cos t - \sin t\,(4 - t)$	18. $2x - \frac{6}{x^2}$	19. $12x^2e^x + 4x^3e^x$
20. $\frac{4}{\sqrt{x}} + \frac{20}{x^5}$	21. $-\frac{3}{4x^2} - \frac{1}{4\sqrt{x}}$	22. $x = 0, 3, 6$	23. $\frac{1-\sqrt{3}}{2}$
24. $y - 12 = \frac{5}{4}(x - 4)$	25. $y - 3 = 2x$	26. Yes! Show work for continuity and differentiability.	27. $a = -\frac{1}{16}$, $b = -\frac{5}{4}$