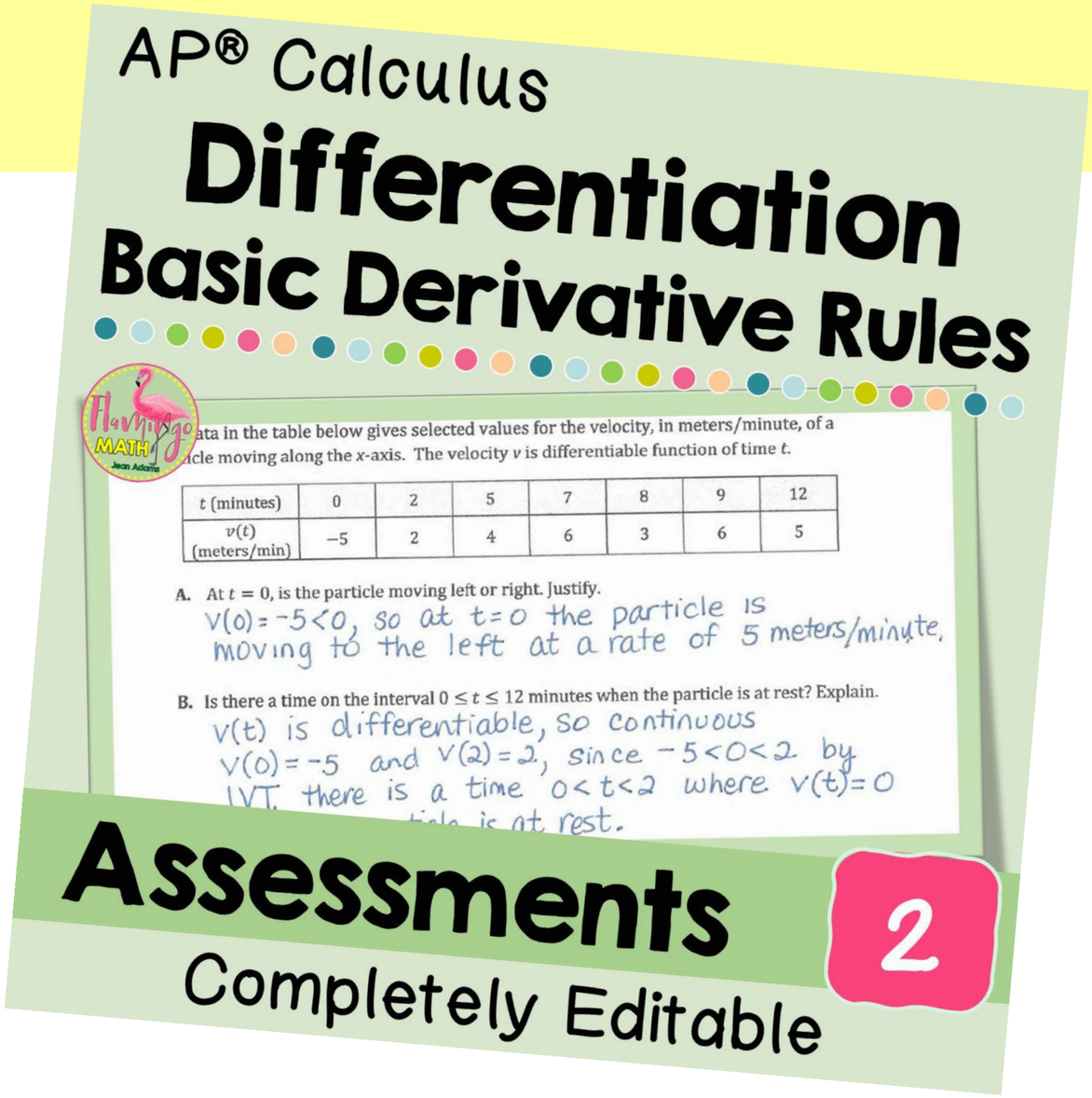
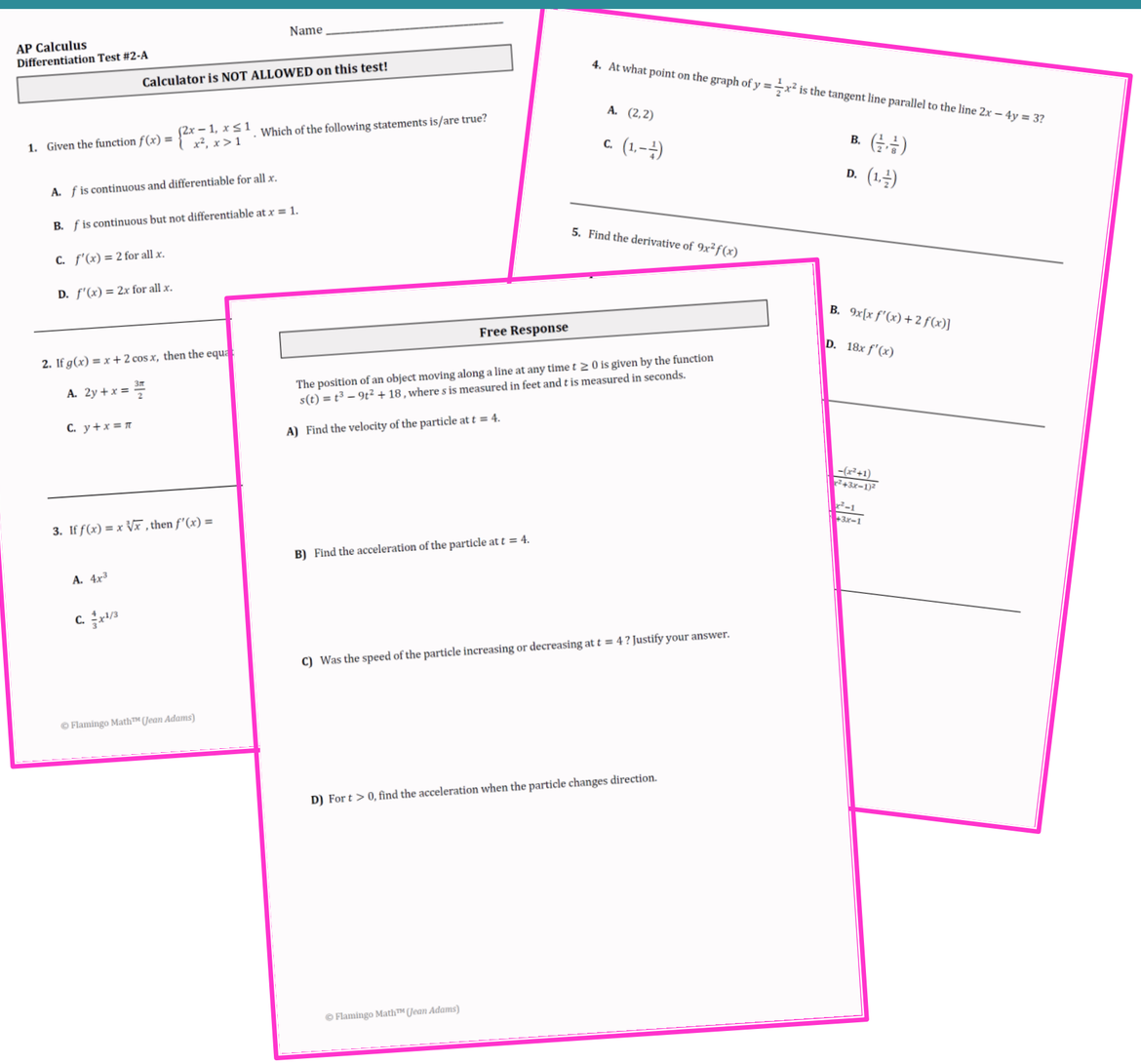
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AP Calculus
Differentiation Test #2-A

Name _____

Calculator is NOT ALLOWED on this test!

1. Given the function $f(x) = \begin{cases} 2x-1, & x \le 1 \\ x^2, & x > 1 \end{cases}$. Which of the following statements is/are true?

   A. f is continuous and differentiable for all x.

   B. f is continuous but not differentiable at $x = 1$.

   C. $f'(x) = 2$ for all x.

   D. $f'(x) = 2x$ for all x.

2. If $g(x) = x + 2\cos x$, then the equa

   A. $2y + x = \frac{3\pi}{2}$

   C. $y + x = \pi$

3. If $f(x) = x\sqrt[3]{x}$, then $f'(x) =$

   A. $4x^3$

   C. $\frac{4}{3}x^{1/3}$

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4. At what point on the graph of $y = \frac{1}{2}x^2$ is the tangent line parallel to the line $2x - 4y = 3$?

   A. $(2, 2)$

   B. $\left(\frac{1}{2}, \frac{1}{8}\right)$

   C. $\left(1, -\frac{1}{4}\right)$

   D. $\left(1, \frac{1}{2}\right)$

5. Find the derivative of $9x^2 f(x)$

   B. $9x[x\,f'(x) + 2\,f(x)]$

   D. $18x\,f'(x)$

$\frac{-(x^2+1)}{x^2+3x-1)^2}$

$\frac{x^2-1}{+3x-1}$

Free Response

The position of an object moving along a line at any time $t \ge 0$ is given by the function $s(t) = t^3 - 9t^2 + 18$, where s is measured in feet and t is measured in seconds.

A) Find the velocity of the particle at $t = 4$.

B) Find the acceleration of the particle at $t = 4$.

C) Was the speed of the particle increasing or decreasing at $t = 4$? Justify your answer.

D) For $t > 0$, find the acceleration when the particle changes direction.

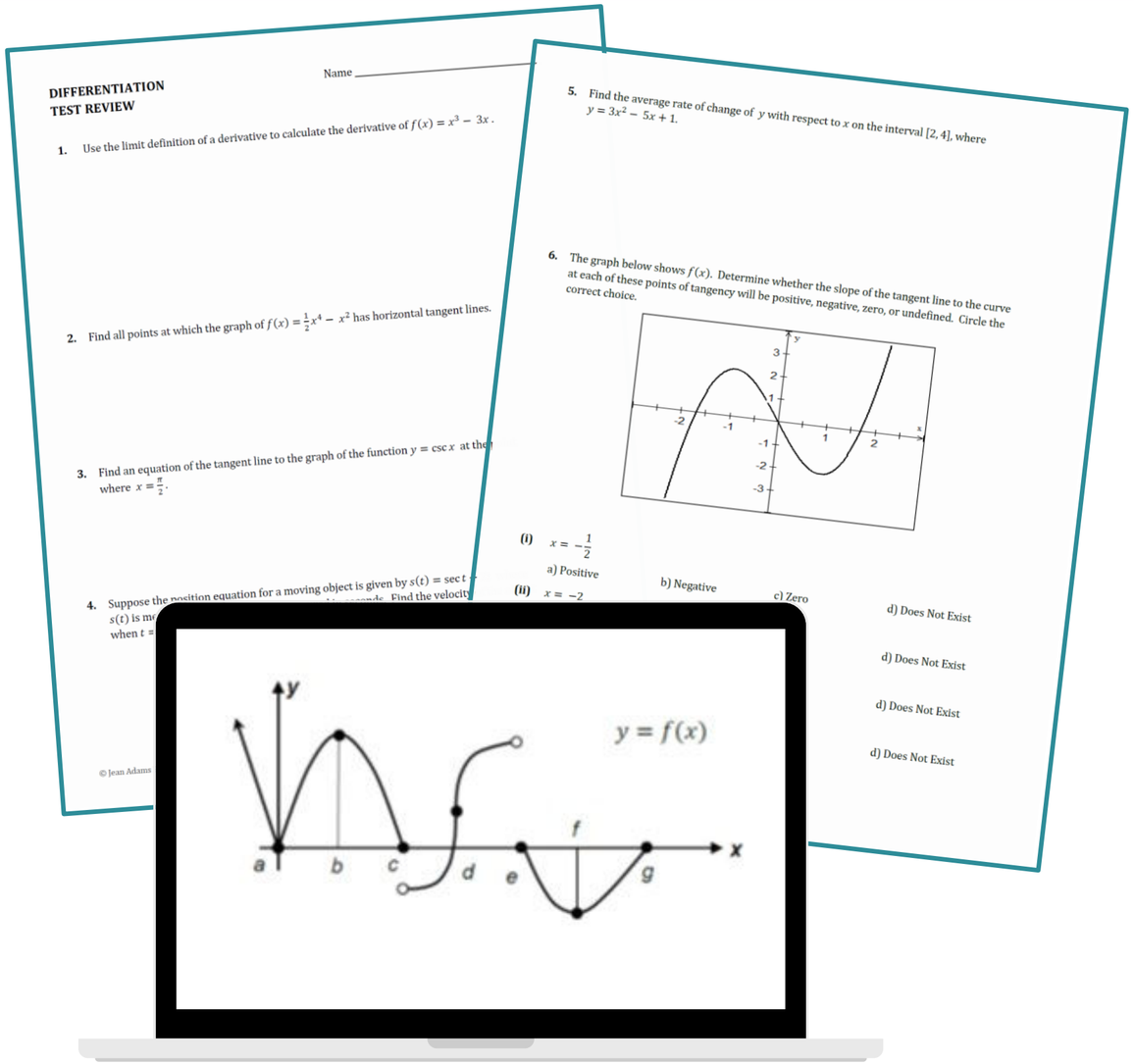
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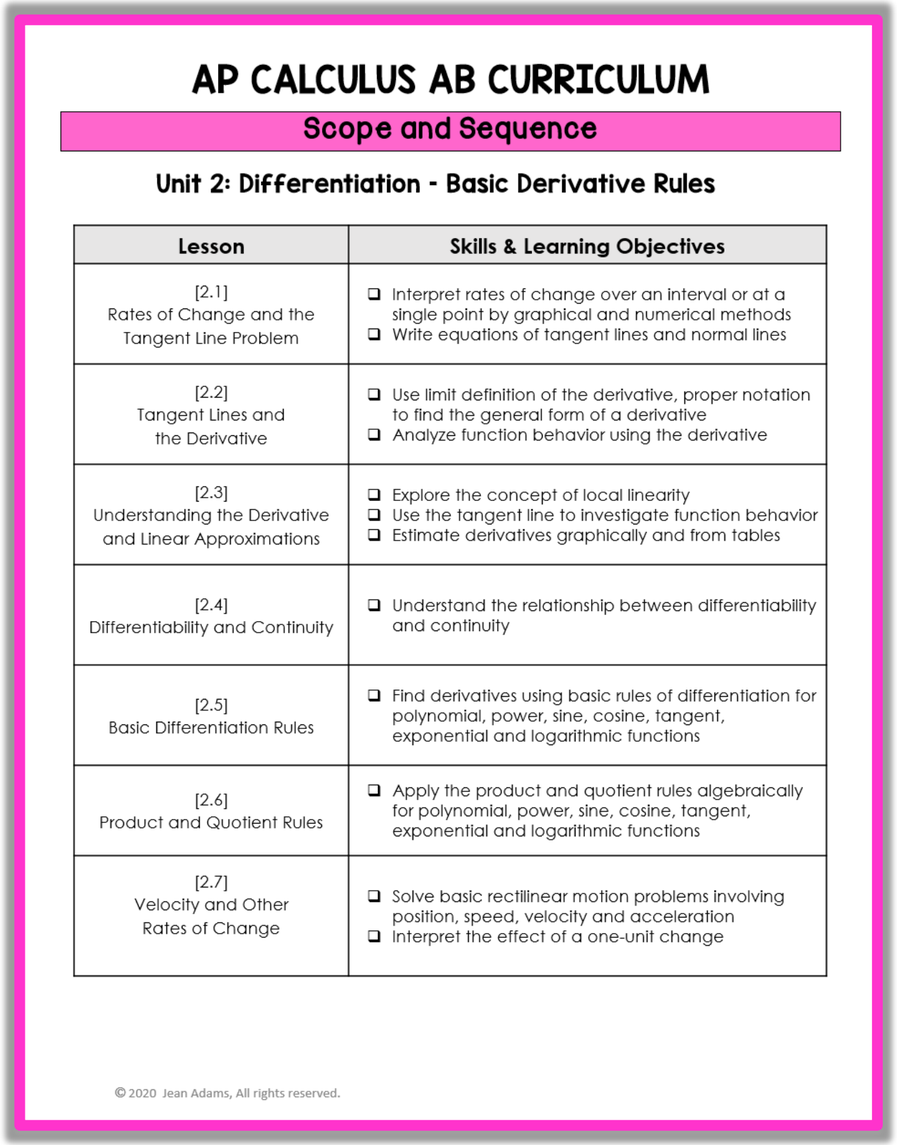
- Editable Review assignments
- Editable assessments
- Full solution sets
- Extra Practice Topics
- Scope and Sequence

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Cover the Standards

Each assessment will provide you and your students with the skills and learning objectives necessary for success in the AP Environment.

- ❑ You will find a scope and sequence document to track the learning objectives for the unit.
- ❑ Each quiz and test is available in two unique forms.
- ❑ You will also have a ***fully-editable version*** for every review, quiz and test to create extra assessment tools.
- ❑ A pacing guide for both AB and BC lessons and testing schedule.



AP CALCULUS AB CURRICULUM

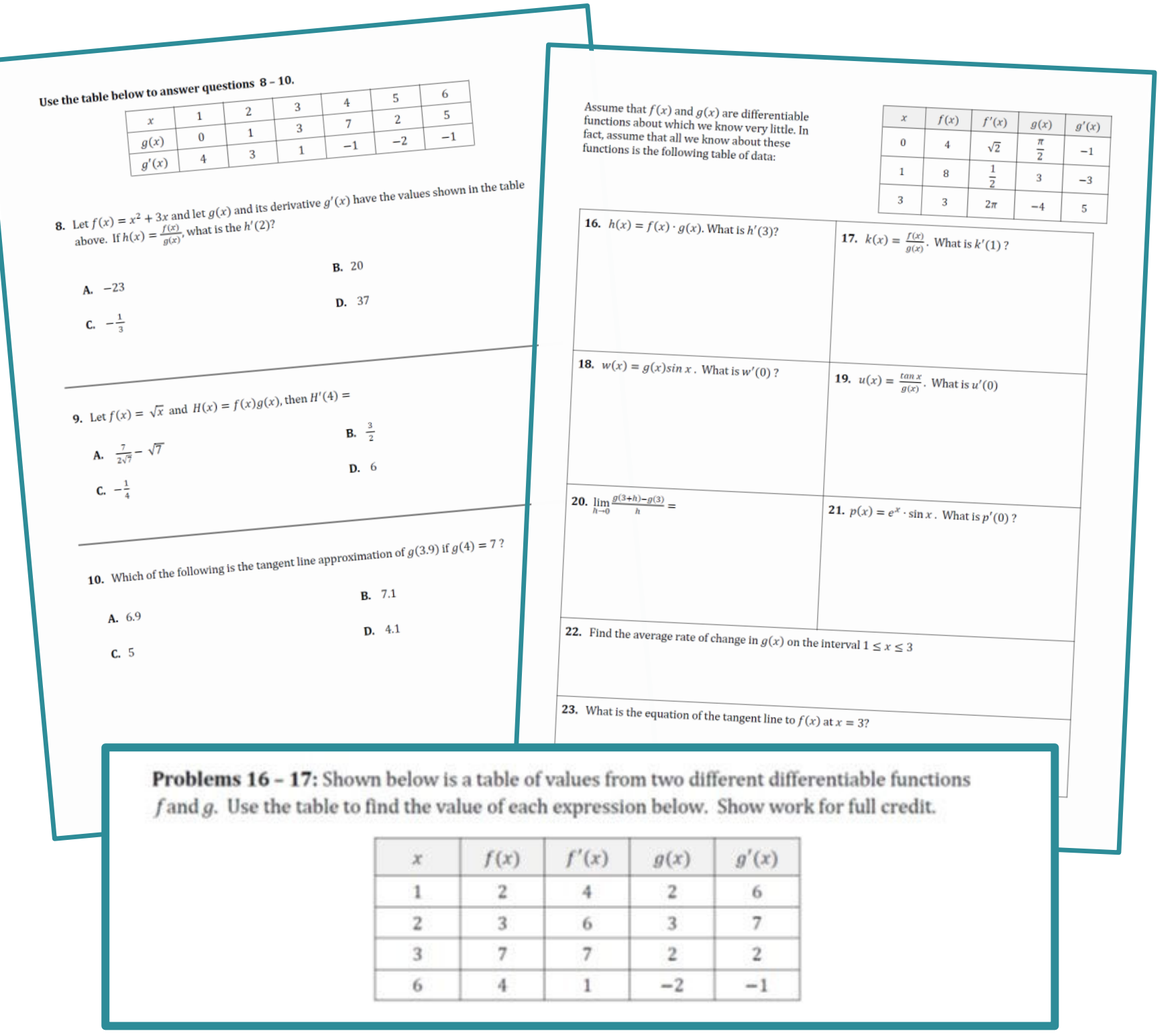
Scope and Sequence

Unit 2: Differentiation - Basic Derivative Rules

Lesson	Skills & Learning Objectives
[2.1] Rates of Change and the Tangent Line Problem	❑ Interpret rates of change over an interval or at a single point by graphical and numerical methods ❑ Write equations of tangent lines and normal lines
[2.2] Tangent Lines and the Derivative	❑ Use limit definition of the derivative, proper notation to find the general form of a derivative ❑ Analyze function behavior using the derivative
[2.3] Understanding the Derivative and Linear Approximations	❑ Explore the concept of local linearity ❑ Use the tangent line to investigate function behavior ❑ Estimate derivatives graphically and from tables
[2.4] Differentiability and Continuity	❑ Understand the relationship between differentiability and continuity
[2.5] Basic Differentiation Rules	❑ Find derivatives using basic rules of differentiation for polynomial, power, sine, cosine, tangent, exponential and logarithmic functions
[2.6] Product and Quotient Rules	❑ Apply the product and quotient rules algebraically for polynomial, power, sine, cosine, tangent, exponential and logarithmic functions
[2.7] Velocity and Other Rates of Change	❑ Solve basic rectilinear motion problems involving position, speed, velocity and acceleration ❑ Interpret the effect of a one-unit change

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Early Reviews from Happy Teachers!



Use the table below to answer questions 8 – 10.

x	1	2	3	4	5	6
$g(x)$	0	1	3	7	2	5
$g'(x)$	4	3	1	−1	−2	−1

8. Let $f(x) = x^2 + 3x$ and let $g(x)$ and its derivative $g'(x)$ have the values shown in the table above. If $h(x) = \frac{f(x)}{g(x)}$, what is the $h'(2)$?

A. -23 B. 20 C. $-\frac{1}{3}$ D. 37

9. Let $f(x) = \sqrt{x}$ and $H(x) = f(x)g(x)$, then $H'(4) =$

A. $\frac{7}{2\sqrt{7}} - \sqrt{7}$ B. $\frac{3}{2}$ C. $-\frac{1}{4}$ D. 6

10. Which of the following is the tangent line approximation of $g(3.9)$ if $g(4) = 7$?

A. 6.9 B. 7.1 C. 5 D. 4.1

Assume that $f(x)$ and $g(x)$ are differentiable functions about which we know very little. In fact, assume that all we know about these functions is the following table of data:

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
0	4	$\sqrt{2}$	$\frac{\pi}{2}$	-1
1	8	$\frac{1}{2}$	3	-3
3	3	2π	-4	5

16. $h(x) = f(x) \cdot g(x)$. What is $h'(3)$?

17. $k(x) = \frac{f(x)}{g(x)}$. What is $k'(1)$?

18. $w(x) = g(x)\sin x$. What is $w'(0)$?

19. $u(x) = \frac{\tan x}{g(x)}$. What is $u'(0)$

20. $\lim_{h\to 0} \frac{g(3+h)-g(3)}{h} =$

21. $p(x) = e^x \cdot \sin x$. What is $p'(0)$?

22. Find the average rate of change in $g(x)$ on the interval $1 \le x \le 3$

23. What is the equation of the tangent line to $f(x)$ at $x = 3$?

Problems 16 – 17: Shown below is a table of values from two different differentiable functions f and g. Use the table to find the value of each expression below. Show work for full credit.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	2	4	2	6
2	3	6	3	7
3	7	7	2	2
6	4	1	−2	−1

> I love these assessments! They are rigorous and have multiple versions to use. *Michelle P.*

> Very comprehensive! I like having the option of AP and non-AP assessments. *Abby M.*

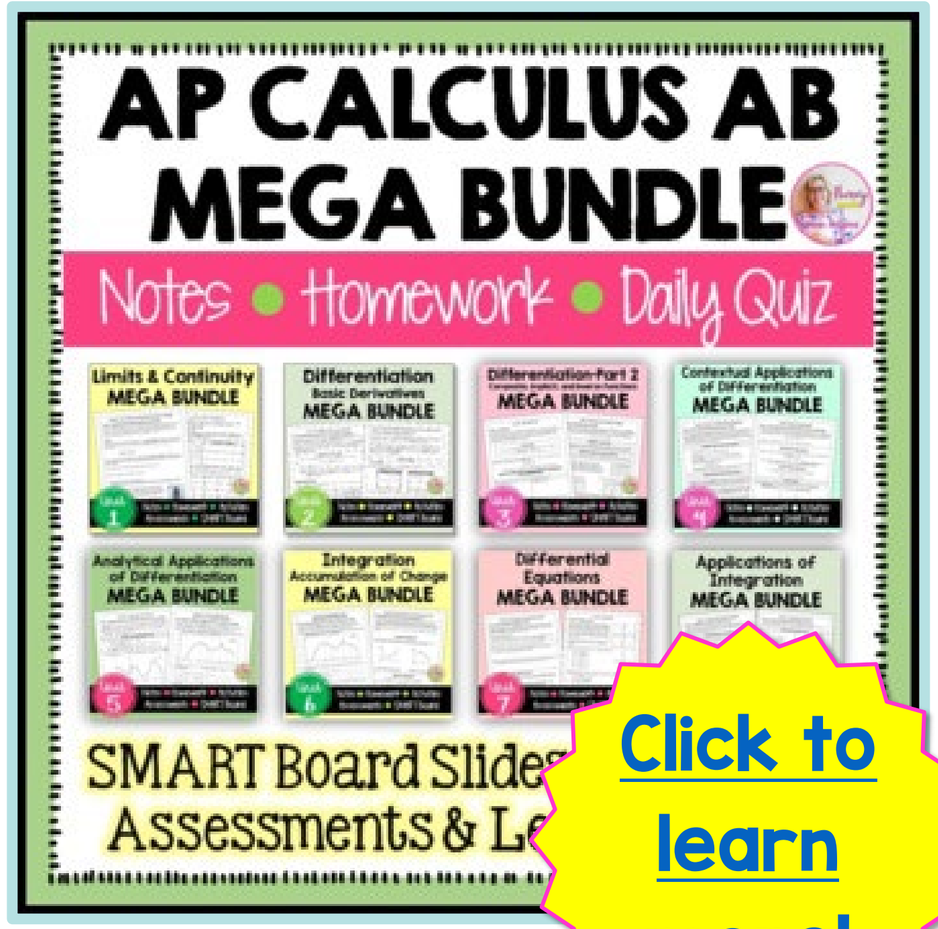
> I love the way that you set up the test (AP Style) It is hard to find good assessments for the students. Your tests are a big help! *Monica B.*

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> “Excellent resource to prepare for the AP Calc Exam. Just finished an AP workshop and am really impressed how aligned this bundle is for getting the Calculus taught. Thank you fir all the hard work put into it. It’s a fabulous resource. *Linda A.*”



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