Name: _____ **AP**

Classwork 31

1. Find the derivative of each function using the definition.

a) $f(x) = x^2$

b) $f(x) = x^3$

c) $f(x) = 7$

d) $f(x) = 4x$

2. Find the slope of each function at $x = 3$

a)

b)

c)

d)

3. Predict the derivative of $y = x^{100}$

4. What is the rule for any derivative of the form $y = x^n$?

Prove that this rule works.

5. Find the derivative of $y = x^3 + x^2 + x$.

6. In general, for a function $f(x) = g(x) + h(x)$, the derivative $f'(x) =$

7. Fill out each chart.

x	x^3	Δy	x	$2x^3$	Δy	x	$3x^3$	Δy	x	$4x^3$	Δy
0			0			0			0		
1			1			1			1		
2			2			2			2		
3			3			3			3		
4			4			4			4		
5			5			5			5		

What happens to the rate of change when you put a coefficient in front of the function?

8. a) Predict the derivative of $y = 5x^3$

   b) Use the definition to prove that this derivative is correct.

9. a) Write a general rule for the derivative of a function $f(x) = Cx^n$

   b) Prove that this rule is actually correct using the definition of a derivative.

10. Find the equation of the tangent line to each point at the given value. Then graph both functions to show you are correct.

a) Tangent to the equation $y = 2x^3$ at $x = 1$

b) Tangent to the equation $y = 1/2x^4$ at $x = 2$

c) Tangent to the equation $y = (x^4)/4$

11. Find the derivative of $f(x) = \frac{1}{x^2}$ using the definition.

Practice Problems

1. Find the derivative of $y = 3x^8 + 2x + 5$
2. Find the derivative of $y = 7x^4 - 2x^2 + 10x$
3. Find the derivative of $y = \frac{1}{x^4}$