Name: _____   **TC**

<center>**Classwork 34**</center>

1. Find the derivative of $f(x) = 3x^6$ **the long way.**

2. 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.

3. Find the derivative of each function using the rule.

a) $f(x) = 3x^7$ b) $f(x) = 6x^2 + 3x + 9$ c) $f(x) = 4x^3 - 2x^2 + 5x + 1$

4. Find the slope of each of the functions above at $x = 3$

a)   b)   c)

5. When does the function $y = 1/3x^3 + 3x^2 + 6x + 7$ have a slope of 1?

6. 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 $x = 2$

7. Fill in the box with the missing exponent. (Yes, I know this is review. :>)

a. $3^4 \cdot 3^{\Box} = 3^9$

b. $5^2 \cdot 5^{\Box} = 5^{10}$

c. $4^3 \cdot 4^{\Box} = 4^5$

d. $6^5 \cdot 6^{\Box} = 6^0$

e. $2^4 \cdot 2^{\Box} = 2^0$

f. $x^1 \cdot x^{\Box} = x^0$

8. Based on your answers to (d), (e), and (f), what does a negative exponent have to mean?

Write a formula for X^{-n} .

9. Find the derivative of $f(x) = \dfrac{1}{x}$ using the definition.

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

<u>Practice Problems</u>

1. When does the graph of $y = 5x^3$ have a slope of 360?

2. What is the slope of $y = 1/2x^4 + 5x^2 + 6$ at $x = 2$?

3. Find the derivative of $y = \dfrac{1}{x^4}$ using the rule.