Unit 3: Derivative Shortcuts

Name: ________________________

You have already learned how to use the limit definition to find derivatives. Now you will be introduced to several ______________________ rules that allow you to find the derivative without direct use of the limit definition.

#1. Derivative of a Constant

If f(x) = k, where k is a constant, then for any x, f′(x)= 0.

Example:

f(x) = 9
f ′(x)= _____

#2. Derivative of a Power (Power Rule)

If $f(x) = x^n$ where n is a rational number, then $f'(x)= nx^{n-1}$.

Examples:

$f(x) = x^3$	$g(x) = \dfrac{1}{x^2}$	$h(x) = \sqrt{x}$
f ′(x)= _____	g′(x)= _____	h′(x)= _____

#3. *If $f(x) = kx^n$, where k is a constant and n is rational, then $f'(x)= k \cdot nx^{n-1}$.*

Examples:

$f(x) = 8x^2$	$g(x) = \dfrac{1}{6x^3}$
f ′(x)= _____	g′(x)= _____

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#4. Derivative of a Polynomial (Sum or Difference Rule)

If f and g are differentiable functions, then $(f \pm g)'(x) = f'(x) \pm g'(x)$.

Examples:

Find the derivative and calculate the slope of the tangent line at the indicated x-value.

$f(x) = 5x^3 + 2x^2$ at (x = -1)

$f'(x)=$ ________

$g(x) = -8x^6 - 5x + 7$ at (x = 3)

$g'(x)=$ _________

$h(x) = \frac{3}{x^2} + \frac{7}{x} - 4$ at (x = -2)

$h'(x)=$ ________

$k(x) = (x^2 + 3x - 5)(2x + 1)$ at (x = 1)

$k'(x)=$ ________