Your Name: ______________________ Partner: Key

Derivative Rules: Level 1

Analytical

$$f(x) = x^2 \cos(x)$$

$$f'(x) =$$

$2x\cos x - x^2 \sin x$

$x(2\cos x - x\sin x)$

x^2	$\cos x$
$2x$	$-\sin x$

Numerical

x	-1	1
$k(x)$	-3	2
$k'(x)$	4	-5

$$h(x) = \frac{k(x)}{3x}$$

$$h'(-1) =$$

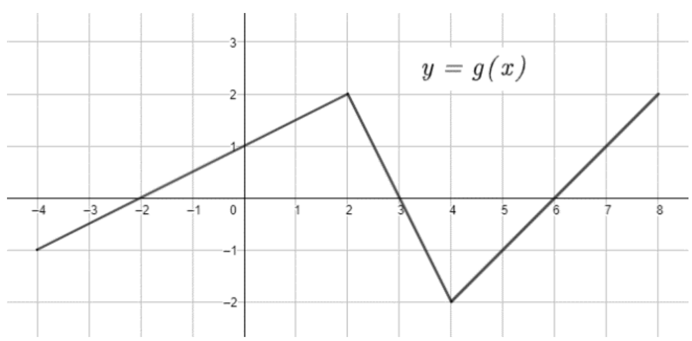
$h'(x) = \dfrac{k'(x) 3x - 3k(x)}{(3x)^2}$

$h'(-1) = \dfrac{4(3)(-1) - 3(-3)}{(-3)^2}$

$= \dfrac{-12 + 9}{9}$

$= -\dfrac{3}{9} = -\dfrac{1}{3}$

Graphical



$$p(x) = 5x \cdot g(x)$$

$$p'(3) =$$

$p(x) = 5\,g(x) + g'(x) \cdot 5x$

$p'(3) = 5(0) + (-2)5(3)$

$= -30$

Conceptual/Verbal

$$g(x) = e^x$$

$$f(x) = 3g(x) - x^2 + 3$$

$$f'(2) =$$

$f'(x) = 3g'(x) - 2x$

$f'(2) = 3(e^x) - 2(2)$

$= 3e^x - 4$

$f(2) = 3e^2 - 4$

Name: key   Block: ____   Date: _________

The Basics of Speed, Velocity and Acceleration   AP Calculus AB

Prior knowledge about the Cartesian coordinate plane

On the Cartesian coordinate plane, as we read numbers along the horizontal axis from left to right, the numbers are increasing, with neg numbers to the left, and pos numbers to the right. Similarly, as we read numbers along the vertical axis from bottom to top, the numbers are increasing, with negative numbers below the x axis and positive numbers above the x axis.

Part I – Speed versus Velocity

Velocity is a function of time. Velocity gives us the rate of movement and the direction of movement.

By contrast, speed gives us the rate of movement, but not the direction of movement.

The formula for speed is speed = $|velocity|$. Thus, by definition, speed is always non - negative.

Part II – The direction of movement

Assume a particle is moving along a horizontal line. When the particle is moving to the right, then $v(t) > 0$. When the particle is moving to the left, then $v(t) < 0$.

If an object is falling vertically, then $v(t) < 0$. If an object is traveling upward, then $v(t) > 0$.

Finally, if $v(t) = 0$, then there are two possible interpretations:

1) the object is at rest or

2) the object is at a point where it is changing direction.