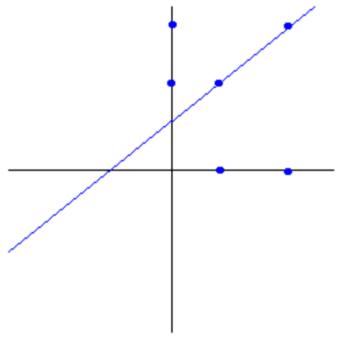
Math 160 – Section 2.4 - Interpretation of a derivative

Recall from section R.4: The expression $\frac{f(x+h)-f(x)}{h}$ **is called the difference quotient.**

Geometrically, the difference quotient represents the slope of the secant line connecting the points

$P(x, f(x))$

$Q(x+h, f(x+h))$



1) AT HOME, COMPLETE THIS PAGE and problem 2-a (on the next page) the rest will be done in class.

Given the function $f(x)=3x^2+6x-8$

Using the given function, complete the following tables and find the slope of the line PQ in each case.

	x	Y = f(x)
P	1	
Q	2	

	x	Y = f(x)
P	1	
Q	1.5	

	x	Y = f(x)
P	1	
Q	1.1	

	x	Y = f(x)
P	1	
Q	1.01	

2) Given the function $f(x) = 3x^2 + 6x - 8$,

a) Find the difference quotient

$$\frac{f(x+h) - f(x)}{h}$$

b) The slope of the line PQ secant to the graph of f(x) can be found by using the expression:

c) Find $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

d) Geometrically, what do you think this limit represents?

e) The derivative of $f(x) = 3x^2 + 6x - 8$ is defined as

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} =$$

f) Geometrically, the derivative represents

g) Using the function $f(x) = 3x^2 + 6x - 8$, complete the following table.

x	Y = $f(x) = 3x^2 + 6x - 8$	Slope of the line tangent to the graph of f(x) at P(x,y)	Equation of the tangent line
1	1		
0			
-1			
-2			