MHF 4UI UNIT 3
RATES OF CHANGE

Using Limits to Find Tangents
PART II

** Last day we looked at finding the slopes of tangents to polynomial functions...today we will look at rational functions and functions with square roots.

Example 1. Find the slope of the tangent to the following curves at the given points:

a) $g(x) = \dfrac{1}{x - 2}$ at the point (3,1)

Formula 1

$$m_{tangent} = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

$$m_{tangent} = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

b) $f(x) = \sqrt{x-2}$ at the point (3, 1)

Formula 1

$$m_{tangent} = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

Formula 2

$$m_{tangent} = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

Example 2: For the following curve
   a) Find the slope of the tangent at a general point a

$$f(x) = \sqrt{x^2 + 9}$$

$$m_{tangent} = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

b) Find the slope of the tangent when x = -2, 0, 2

c) Describe how the slope of the function changes as x
   increases

d) Find the equation of the tangent line at the point (4, 5)

** Note , there may be a few homework questions where you need to combine rationalizing and finding a common denominator in one question.

If so, find a common denominator first, then rationalize.