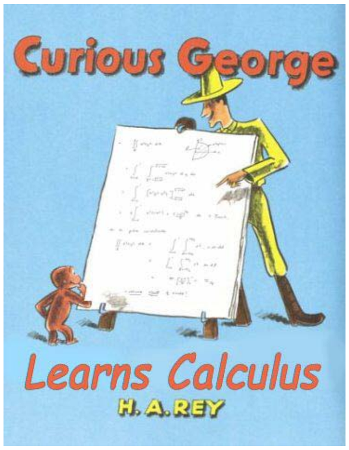
BSN – MCV 4U – Specialist High Skills Major
Contextualized Learning Activity
Business and Economics Applications of Differentiation for Calculus Students



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The study of **Calculus** involves investigating the rates of change of functions. The instantaneous rate of change of a function in graphical form is the **slope of a line or tangent** drawn at a particular point. Calculating the derivative of the equation of a function is the process known as **differentiation**.

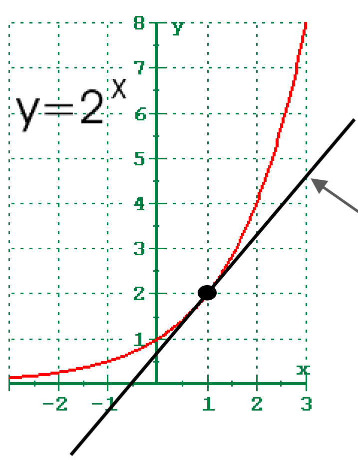
The focus of this activity is to build on a foundation of the understanding of determining first and second differences of functions and applying these skills to economics and business concepts.

Lesson 1: Determining Rate of Change

In class, you have already been introduced to the topic of differentiation. At this point, you should understand the definition of a derivative.

- The derivative of $f(x)$ at a point x is given by the equation $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

- The derivative of a function at a point $(a, f(a))$ can be interpreted as:
  - The slope of a tangent line to the function at this point
  - The instantaneous rate of change of the function at this point



Tangent Line at x = 1
$m_{tan} = y'$
m_{tan} =(approx) 1.25

The following is a summary of the Rules for Differentiation:

Constant Rule: Given , then .

Power Rule: Given , then .

Constant Multiplier Rule: Given , then .

Sum or Difference Rule: Given , then .

Product Rule: Given , then .

Quotient Rule: Given , then .

Chain Rule: Given , then .

Provide complete solutions to **Lesson 1 questions**: *(complete solutions found in Appendix A)* *(answer key found in Appendix B)*

1. Differentiate the following polynomials equations (do not simplify):

a)

b)

c)

d)

e)

f)

g)

h)

i)

j)

2. Evaluate the derivative of the function at the point where $x = 4$. Explain what this means.

3. Determine the **equation of the tangent** to the curve of at the point (2, 25).