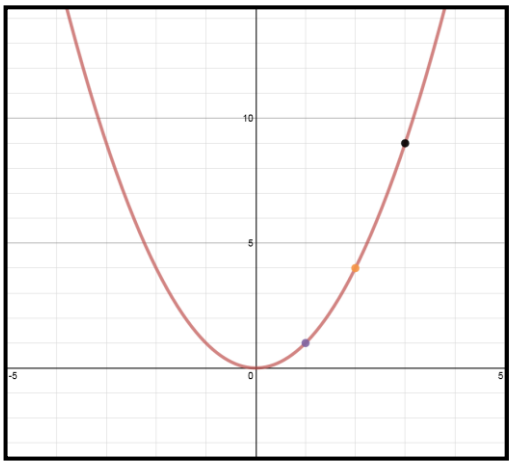
A. Concept Review



a. If $f(x) = x^2 + 2x$, determine the instantaneous rate of change of $f(x)$ at $x = 3$. Interpret your results.

b. Using the same function, $f(x) = x^2 + 2x$, determine the slope of the tangent line to the function at $x = 2$. Interpret your results.

c. Determine $f'(1)$ if $f(x) = x^2 + 2x$. Interpret your results.

B. Exploration – The Derivative Function of $f(x) = x^2$

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

d. INTERPRET the MEANING of this newly derived function ➔

C. Exploration – The Derivative Function of $f(x) = x^3$

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

d. INTERPRET the MEANING of this newly derived function ➔

Exploration – The Derivative Function of $f(x) = x^4$

e. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

f. Create a scatter plot on the TI84

g. Determine the equation of the function that you see on the scatterplot ➔

D. Exploration – The Derivative Function of f(x) = x

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

E. Exploration – The Derivative Function of f(x) = 3

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

F. Summary

Are you seeing any pattern? Can you summarize the pattern in words? With a "general formula"?

G. Extending the Pattern – Part 1

Now let's see if our "prediction" works if I think of more "difficult" examples ➔ I am going to see if my "general formula" sometimes DOESN'T work

H. Exploration – The Derivative Function of $f(x) = 4x^2$

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

I. Exploration – The Derivative Function of $f(x) = -2x^3$

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

J. Exploration – The Derivative Function of $f(x) = ½x^4$

a. Using the TI-84, complete the following chart:

x	-4	-3	-2	-1	0	1	2	3	4
f'(x)									

b. Create a scatter plot on the TI84

c. Determine the equation of the function that you see on the scatterplot ➔

K. Extending the Pattern – Part 2

Now let's see if our "prediction" works if I think of more "difficult" examples ➔ I am going to see if my "general formula" sometimes DOESN'T work

L. Exploration – The Derivative Function of $f(x) = x^{-1}$

a. Using the TI-84, we will try another approach:
   i. PREDICT what you think the derivative equation should be ➔
   ii. Graph $f(x) = x^{-1}$ in y1
   iii. Graph your predicted derivative function in y2
   iv. Let's ask the calculator to graph the derivative function of f(x) in y3.
b. If our prediction in y2 IS CORRECT, how many functions should we see when the TI-84 graphs y1, y2, y3?
c. What is our conclusion regarding our prediction?

M. Exploration – The Derivative Function of $f(x) = x^{-2}$

a. Using the TI-84, we will try another approach:
   i. PREDICT what you think the derivative equation should be ➔
   ii. Graph $f(x) = x^{-2}$ in y1
   iii. Graph your predicted derivative function in y2
   iv. Let's ask the calculator to graph the derivative function of f(x) in y3.
b. If our prediction in y2 IS CORRECT, how many functions should we see when the TI-84 graphs y1, y2, y3?
c. What is our conclusion regarding our prediction?

N. Exploration – The Derivative Function of $f(x) = x^{-3}$

a. Using the TI-84, we will try another approach:
   i. PREDICT what you think the derivative equation should be ➔
   ii. Graph $f(x) = x^{-3}$ in y1
   iii. Graph your predicted derivative function in y2
   iv. Let's ask the calculator to graph the derivative function of f(x) in y3.
b. If our prediction in y2 IS CORRECT, how many functions should we see when the TI-84 graphs y1, y2, y3?
c. What is our conclusion regarding our prediction?

O. Extending the Pattern – Part 3

Now let's see if our "prediction" works if I think of more "difficult" examples ➔ I am going to see if my "general formula" sometimes DOESN'T work

P. Exploration – The Derivative Function of $f(x) = 4x - x^2$

a. Using the TI-84, we will try another approach:
   i. PREDICT what you think the derivative equation should be ➔
   ii. Graph $f(x) = 4x - x^2$ in y1
   iii. Graph your predicted derivative function in y2
   iv. Let's ask the calculator to graph the derivative function of f(x) in y3.
b. If our prediction in y2 IS CORRECT, how many functions should we see when the TI-84 graphs y1, y2, y3?
c. What is our conclusion regarding our prediction?

Q. Exploration – The Derivative Function of $f(x) = x^2 - 6x + 5$

a. Using the TI-84, we will try another approach:
   i. PREDICT what you think the derivative equation should be ➔
   ii. Graph $f(x) = x^2 - 6x + 5$ in y1
   iii. Graph your predicted derivative function in y2
   iv. Let's ask the calculator to graph the derivative function of f(x) in y3.
b. If our prediction in y2 IS CORRECT, how many functions should we see when the TI-84 graphs y1, y2, y3?
c. What is our conclusion regarding our prediction?

R. Exploration – The Derivative Function of $f(x) = -2x^3 + 5x^2 - x + 1$

a. Using the TI-84, we will try another approach:
   i. PREDICT what you think the derivative equation should be ➔
   ii. Graph $f(x) = -2x^3 + 5x^2 - x + 1$ in y1
   iii. Graph your predicted derivative function in y2
   iv. Let's ask the calculator to graph the derivative function of f(x) in y3.
b. If our prediction in y2 IS CORRECT, how many functions should we see when the TI-84 graphs y1, y2, y3?
c. What is our conclusion regarding our prediction?