

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

Use this function to answer the questions on this page.

- Determine the slope of the secant line from $x = 2$ to $x = 3$

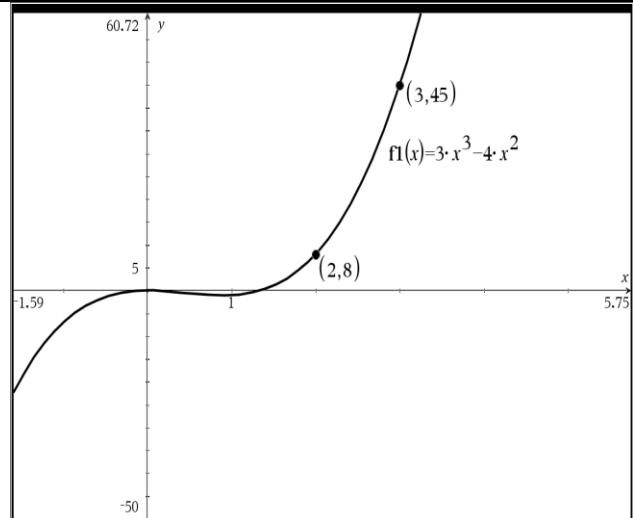
SHOW DIFFERENCE QUOTIENT

- Write the equation of the secant line from $x = 2$ to $x = 3$

(CALCULUS DOES NOT USUALLY CARE ABOUT Y INTERCEPT, so use modified point slope format)

- Determine the average rate of change (AROC) from $x = 2$ to $x = 3$

SHOW DIFFERENCE QUOTIENT



- Use $x = 1.9999$ and $x = 2$ to APPROXIMATE the instantaneous rate of at $x = 2$

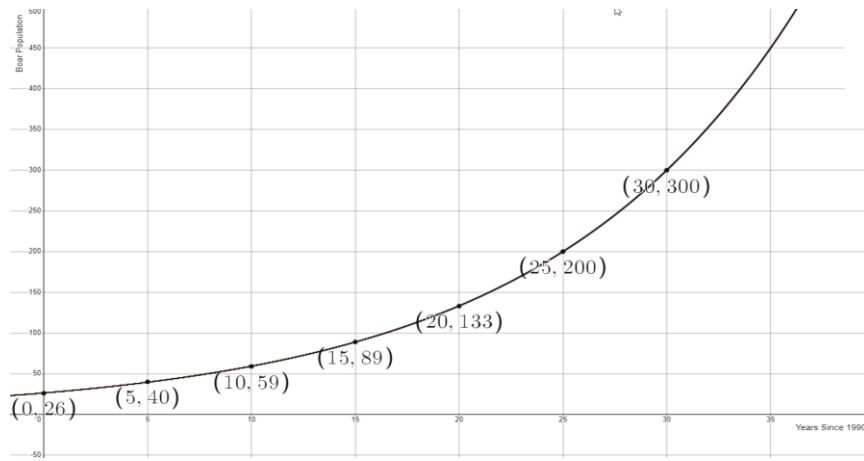
SHOW DIFFERENCE QUOTIENT

- Use $x = 2.0001$ and $x = 2$ to APPROXIMATE the instantaneous rate of at $x = 2$

SHOW DIFFERENCE QUOTIENT

- What did #4 and #5 suggest as the APPROXIMATE slope of the tangent line?

- Write the equation of APPROXIMATE tangent line at $x = 2$



Use this graph and the given information below to answer the questions below.

The population of a community of wild boar is modeled by the function b , where $b(x)$ gives the number of boar and x gives the number of years since 1990 for $0 \leq x \leq 30$ years

8. Sketch the tangent line at $x = 20$ years after 1990. DO THIS ON THE GRAPH ITSELF!
9. Using the given graph and the related points, give a rough estimate of the instantaneous rate of change at $x = 20$ years. Give a related difference quotient based on this rough estimate.
10. Give a related difference quotient of a better approximation for $b(x)$ IF YOU KNEW the function for $b(x)$!
11. Suppose that you knew that this $f(x)$ was, in fact, $b(x) = 26.3374(1.08447)^x$ with x measured in years and $b(x)$ measured in meters. Give a better estimate of the instantaneous rate of change at $x = 20$ years. Give a related difference quotient based on this rough estimate.

The number of jobs created in the U.S. for the 2021 economy can be modeled by J , where $J(m)$ is the number of new jobs and m is the month in 2021 for $0 \leq m \leq 12$

12. What does $J(3)$ represent? (hint: a specific month should be mentioned in the best explanation)
13. What does $\frac{J(8)-J(3)}{8-3}$ represent? Be specific and use units!
14. What does $\frac{J(9)-J(8.9999)}{9-8.9999}$ represent? Be specific and use units!

EC: If you could improve one thing about yourself, what would it be and why?

$$f(x) = -5x^3 - 9x^2$$

Use this function to answer the questions on this page.

- Determine the slope of the secant line from $x = 1$ to $x = 2$

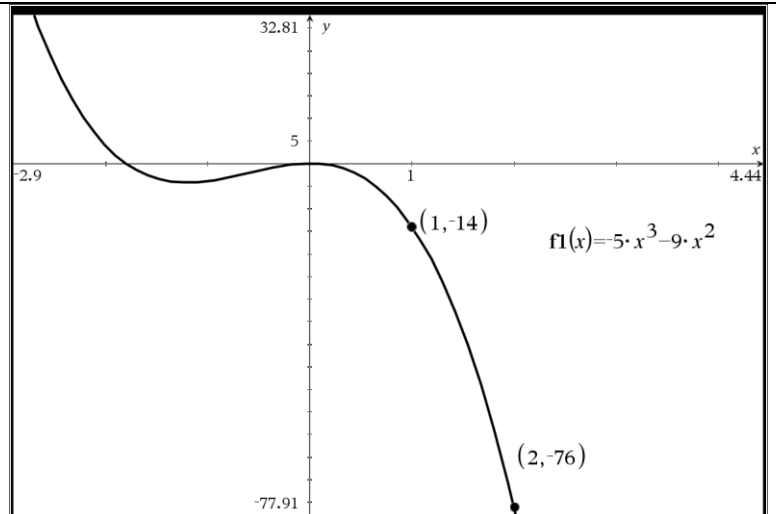
SHOW DIFFERENCE QUOTIENT

- Write the equation of the secant line from $x = 1$ to $x = 2$

(CALCULUS DOES NOT USUALLY CARE ABOUT Y INTERCEPT, so use modified point slope format)

- Determine the average rate of change (AROC) from $x = 1$ to $x = 2$

SHOW DIFFERENCE QUOTIENT



- Use $x = 1.9999$ and $x = 2$ to APPROXIMATE the instantaneous rate of at $x = 2$

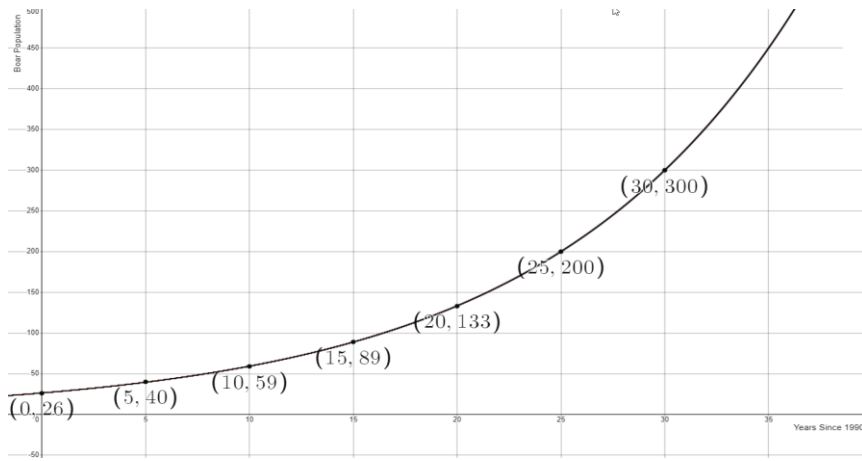
SHOW DIFFERENCE QUOTIENT

- Use $x = 2.0001$ and $x = 2$ to APPROXIMATE the instantaneous rate of at $x = 2$

SHOW DIFFERENCE QUOTIENT

- What did #4 and #5 suggest as the APPROXIMATE slope of the tangent line?

- Write the equation of APPROXIMATE tangent line at $x = 2$



Use this graph and the given information below to answer the questions below.

The population of a community of wild boar is modeled by the function b , where $b(x)$ gives the number of boar and x gives the number of years since 1990 for $0 \leq x \leq 30$ years

8. Sketch the tangent line at $x = 15$ years after 1990. DO THIS ON THE GRAPH ITSELF!
9. Using the given graph and the related, points give a rough estimate of the instantaneous rate of change at $x = 15$ years. Give a related difference quotient based on this rough estimate.
10. Give a related difference quotient of a better approximation for $b(x)$ IF YOU KNEW the function for $b(x)$!
11. Suppose that you knew that this $f(x)$ was, in fact, $b(x) = 26.3374(1.08447)^x$ with x measured in years and $b(x)$ measured in meters. Give a better estimate of the instantaneous rate of change at $x = 15$ years. Give a related difference quotient based on this rough estimate.

A hurricane has formed in the Atlantic Ocean and is headed for Miami. It's distance from Miami can be modeled D , where $D(t)$ is the number of miles from Miami and t is the hours since Monday Morning for $0 \leq t \leq 96$

12. What does $D(50)$ represent? (hint: a specific hour should be mentioned in the best explanation)

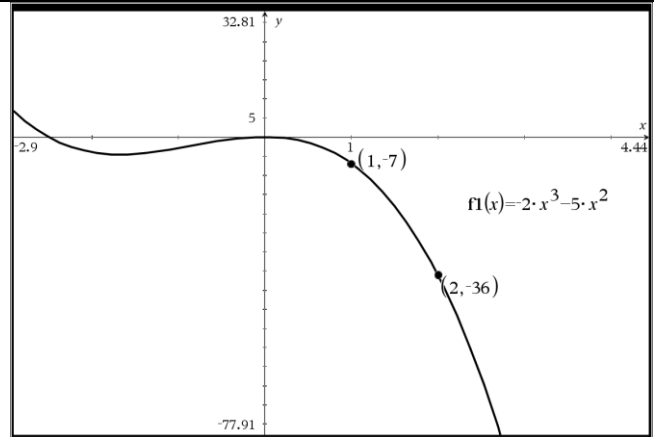
13. What does $\frac{D(40)-D(30)}{40-30}$ represent? Be specific and use units!

14. What does $\frac{D(18)-D(17.9999)}{18-17.9999}$ represent? Be specific and use units!

EC: If you could improve one thing about yourself, what would it be and why?

$$f(x) = -2x^3 - 5x^2$$

Use this function to answer the questions on this page.



- Determine the slope of the secant line from $x = 1$ to $x = 2$

SHOW DIFFERENCE QUOTIENT

- Write the equation of the secant line from $x = 1$ to $x = 2$
(CALCULUS DOES NOT USUALLY CARE ABOUT Y INTERCEPT, so use modified point slope format)

- Determine the average rate of change (AROC) from $x = 1$ to $x = 2$

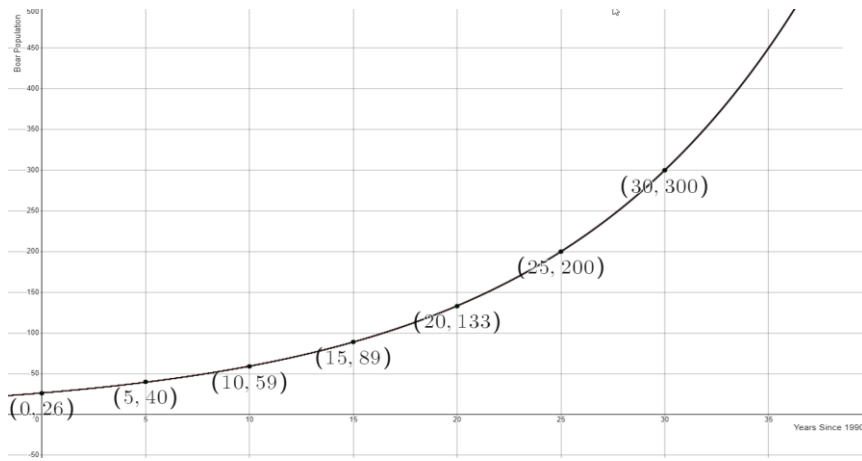
SHOW DIFFERENCE QUOTIENT

- Use $x = 0.9999$ and $x = 1$ to APPROXIMATE the instantaneous rate of at $x = 1$
SHOW DIFFERENCE QUOTIENT

- Use $x = 1.0001$ and $x = 1$ to APPROXIMATE the instantaneous rate of at $x = 1$
SHOW DIFFERENCE QUOTIENT

- What did #4 and #5 suggest as the APPROXIMATE slope of the tangent line?

- Write the equation of APPROXIMATE tangent line at $x = 1$



Use this graph and the given information below to answer the questions below.

The population of a community of wild boar is modeled by the function b , where $b(x)$ gives the number of boar and x gives the number of years since 1990 for $0 \leq x \leq 30$ years

8. Sketch the tangent line at $x = 25$ years after 1990. DO THIS ON THE GRAPH ITSELF!
9. Using the given graph and the related points, give a rough estimate of the instantaneous rate of change at $x = 25$ years. Give a related difference quotient based on this rough estimate.
10. Give a related difference quotient of a better approximation for $b(x)$ IF YOU KNEW the function for $b(x)$!
11. Suppose that you knew that this $f(x)$ was, in fact, $b(x) = 26.3374(1.08447)^x$ with x measured in years and $b(x)$ measured in meters. Give a better estimate of the instantaneous rate of change at $x = 25$ years. Give a related difference quotient based on this rough estimate.

The number of people enlisting in the army each year can be modeled by E , where $E(t)$ is the number of new recruits and t is the years since 1980 for $0 \leq t \leq 20$

12. What does $E(9)$ represent? (hint: a specific year should be mentioned in the best explanation)
13. What does $\frac{E(10)-E(4)}{10-4}$ represent? Be specific and use units!
14. What does $\frac{E(11)-E(10.9999)}{11-10.9999}$ represent? Be specific and use units!

EC: If you could improve one thing about yourself, what would it be and why?

$$f(x) = 2x^2 - 4x$$

How do I get the difference quotient on TI Nspire?



Difference quotient

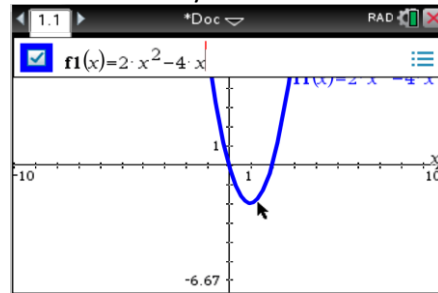
Note: this is the difference quotient $\frac{f(x_2)-f(x_1)}{x_2-x_1}$

In previous classes, we called this SLOPE, in upper-level classes leading to CALCULUS, we use the fancier term, but it is all still about SLOPE or Rate of Change.

On the TI Nspire, it should be $\frac{f_1(x_2)-f_1(x_1)}{x_2-x_1}$

Option 1:

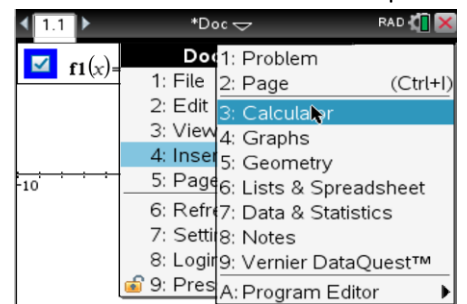
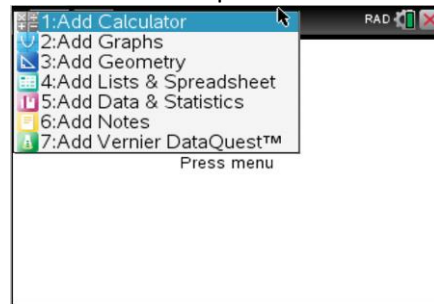
1. Define your function on Graphs page.



2. Add a calculator page (Press CTRL i, or press DOC button and INSERT PAGE)

This is CTRL i path or CTRL DOC Button path

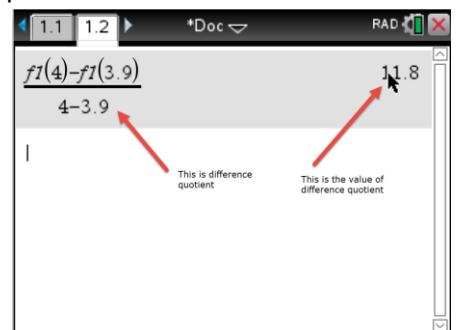
This is DOC Button path



3. Press CTRL / button to insert a fraction



4. Press VAR button (faster method) or type f1() using keystrokes (slower method) directly to create difference quotient



How do I get the difference quotient on TI Nspire?



Difference quotient

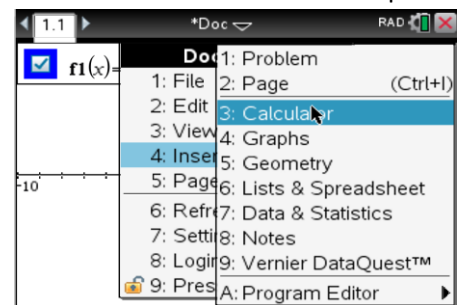
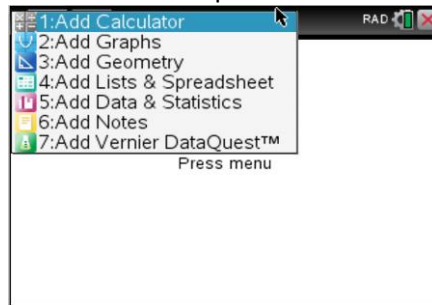
Note: this is the difference quotient $\frac{f(x_2)-f(x_1)}{x_2-x_1}$

In previous classes, we called this SLOPE, in upper-level classes leading to CALCULUS, we use the fancier term, but it is all still about SLOPE or Rate of Change.

On the TI Nspire, it should be $\frac{f_1(x_2)-f_1(x_1)}{x_2-x_1}$

Option 2:

1. Add a calculator page (Press CTRL i, or press DOC button and INSERT PAGE)
This is CTRL i path or CTRL DOC Button path This is DOC Button path



2. Define your function using := button (this is CTRL and the button immediately to the RIGHT of the 9 button (you know it worked if it says DONE)
3. Press CTRL / button to insert a fraction.
4. Press VAR button (faster method) or type f1() using keystrokes (slower method) directly to create difference quotient

