Finding Zeros, Critical Numbers, and Inflection Points of a Function

Kevin Fitzpatrick • CC Edwards

CALCULATORS: Casio: *fx-9750G Plus & cfx-9850G Series*
TI: *TI-83 Plus, TI-84 Plus & TI-83/TI-84 Plus Silver Editions*

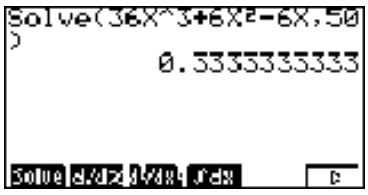
CASIO GRAPHING CALCULATORS

The zeros of a function $f(x)$ are the solutions to the equation $f(x) = 0$. These solutions are also called the x-intercepts of the function, since these are the x-coordinates of the points where the graph of $y = f(x)$ touches the x-axis.

In calculus, the solutions $f'(x) = 0$ (and the values of x where $f'(x)$ is undefined) and are the critical numbers of $f(x)$ and the solutions to $f''(x) = 0$ give the x-coordinates of the inflection points of $f(x)$. So the method of finding the zeros of a function can also be used to find the critical numbers and inflection points of a function.

To solve $36x^3 + 6x^2 - 6x = 0$ on the Home screen:

1. Choose **RUN**(icon 1) from the Main MENU.
2. Press **OPTN** then **F4**(CALC) then **F1**(Solve).
3. In the Solve command input as follows: **Solve** (function, seed guess). It will find the root closest to the seed guess
4. Press the **right arrow**, the entry will reappear. You can change the seed guess and repeat as often as necessary until you have all the roots you need.

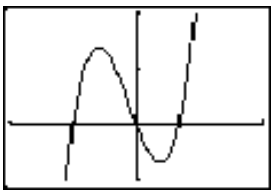


TI GRAPHING CALCULATORS

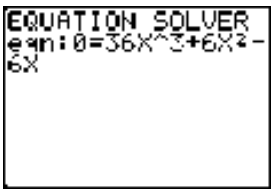
The zeros of a function $f(x)$ are the solutions to the equation $f(x) = 0$. These solutions are also called the x-intercepts of the function, since these are the x-coordinates of the points where the graph of $y = f(x)$ touches the x-axis.

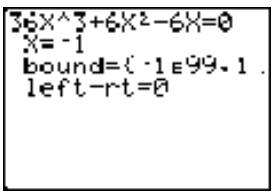
In calculus, the solutions $f'(x) = 0$ (and the values of x where $f'(x)$ is undefined) and are the critical numbers of $f(x)$ and the solutions to $f''(x) = 0$ give the x-coordinates of the inflection points of $f(x)$. So the method of finding the zeros of a function can also be used to find the critical numbers and inflection points of a function.

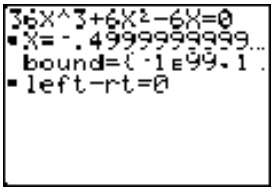
To solve $36x^3 + 6x^2 - 6x = 0$ on the Home screen:

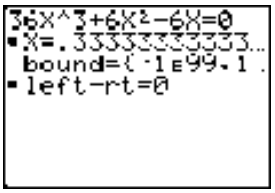


1. Press **MATH up arrow ENTER** to select Solver from the MATH/MATH menu. If you don't see the title EQUATION SOLVER at the top of the screen, press the **up arrow** key.
2. Enter your equation and then press **ENTER**. (All equations in the Equation Solver must be set equal to 0.)
3. Enter a value for x that is near the zero you want to find.
4. Press **ALPHA ENTER** to find the solution nearest to the value entered in the previous step.
5. To find another solution, repeat Steps 3 and 4.









Finding Zeros, Critical Numbers, and Inflection Points of a Function

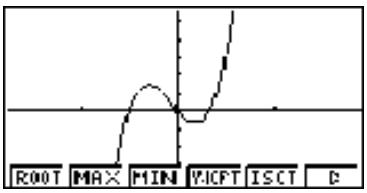
continued

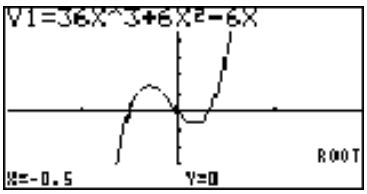
CALCULATORS: Casio: *fx-9750G Plus & cfx-9850G Series*
TI: *TI-83 Plus, TI-84 Plus & TI-83/TI-84 Plus Silver Editions*

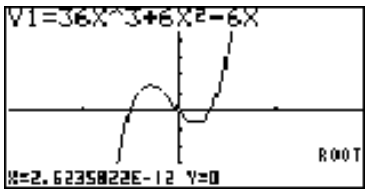
CASIO GRAPHING CALCULATORS

To solve $36x^3 + 6x^2 - 6x = 0$ in a Graph window:

1. Choose **GRAPH**(icon 5) from the Main Menu.
2. Enter the function into one of the Y= slots. Graph in an appropriate viewing window.
3. Press **F5**(G-Solv).
4. Press **F1**(ROOT). It will, without further input, find the leftmost root in the viewing window.
5. Press the **right arrow** and it will find the next root to the right.
6. Repeat the process to find each subsequent root .





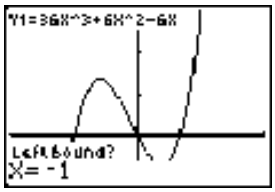


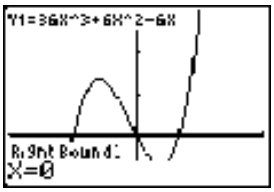
User Note: With each root found, the screen displays the function, the value of the root, and the cursor moves to the position of the root on the graph.

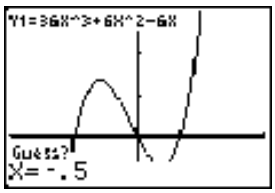
TI GRAPHING CALCULATORS

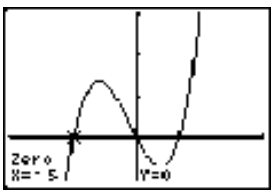
To solve $36x^3 + 6x^2 - 6x = 0$ in a Graph window:

1. Graph $f(x) = 36x^3 + 6x^2 - 6x = 0$ in an appropriate viewing window.
2. Press **2nd CALC 2** to select the zero option from the GRAPH/CALC menu.
3. Key in a value of x to the left of the first x-intercept and then press **ENTER** .
4. Key in a value of ***x*** to the right of the first x-intercept and then press **ENTER** .
5. Key in a value of x that is between the entries made in Steps 3 and 4.
6. Press **ENTER** to find the zero (x-intercept).
7. To find another zero, repeat Steps 2 through 6.









THE CASIO ADVANTAGE

- Same functionality
- Greater efficiency, much fewer keystrokes
- Move more directly to the desired result
- No danger of capturing a value that is not desired
- The *fx*-9750G Plus costs approximately 1/2 the price of the TI-83 plus.

CASIO GRAPHING CALCULATORS	*TI GRAPHING CALCULATORS*