

Steps for Newton's Method on the TI-83/84

(Version 1: *Formula Not Simplified*)

1. Enter the formula for $f(x)$ into Y_1 .

2. Enter the formula for $f'(x)$ into Y_2 .

You don't want to actually graph the derivative, so turn off this graph by placing your cursor over the "=" and pressing [ENTER]. You will see that the "=" is no longer highlighted. When you press [GRAPH], it will now only graph Y_1 .

3. Look at the graph of $f(x)$ and choose a value for your initial guess.

4. On the Home Screen, enter this number for your initial guess and [ENTER].

5. We need to get the formula $\text{Ans} - Y_1(\text{Ans})/Y_2(\text{Ans})$ exactly as shown. Notice that this is Newton's Formula $x_n - f(x_n)/f'(x_n)$, where Ans is the last output value that becomes the new input.

To get the Y_1 and Y_2 you must use the VARS menu: Press [VARS], then move over to highlight Y-VARS. Press [1] to select Function... and Press [1] or [2] to paste Y_1 or Y_2 to your home screen.

Enter the following keys exactly as indicated*:

[2nd][ANS] - [VARS] [▶] [1][1] [(] [2nd][ANS] [)] [÷] [VARS] [▶] [1][2] [(] [2nd][ANS] [)]

Make sure the formula appears as $\text{Ans} - Y_1(\text{Ans})/Y_2(\text{Ans})$ on the Home Screen.

6. Press [ENTER] repeatedly to execute the formula in step 5 with the updated Ans . Continue until the answer has converged to the desired number of decimal places.

[Note: You do not need to re-type Newton's Formula for a new problem. Follow the steps below.]

- Enter the new function and its derivative as Y_1 and Y_2 (Steps 1-2 above. Also turn off the graph for Y_2)
- Clear the home screen
- Enter a new starting value in your calculator. It is now stored as [Ans]. (Steps 3-4 above)
- Press [2nd] [Entry] until you see the formula $\text{Ans} - Y_1(\text{Ans})/Y_2(\text{Ans})$ and press [Enter]. (Replaces step 5 above)
- Press [ENTER] repeatedly (Step 6 above)

* If you have a TI-89, typing [2nd][ANS] will enter $\text{ANS}(1)$ on your screen. Use the arrow and/or backspace and delete keys to delete the 1 and get $\text{ANS}()$ with empty parentheses. If you leave it as $\text{ANS}(1)$, it will actually replace the answer with the value and you won't be able to do the iteration by just pressing ENTER repeatedly. Also, to get y_1 and y_2 on the screen, just press the [Y] button followed by [1] or [2]. [Note: On the TI-89 it might be easier to store the iterations in x – see this website <http://www.tc3.edu/instruct/sbrown/ti83/newton.htm>]

Steps for Newton's Method on the TI-83/84

(Version 2: Formula Simplified)

1. Enter the formula for $f(x)$ into Y_1 . [Note: This is for graphing purposes only.]
2. Look at the graph of $f(x)$ and choose a value for your initial guess.
3. On the Home Screen, enter this number for your initial guess and press **[ENTER]**.
4. By hand, simplify Newton's Formula for x_{n+1} . Enter the RHS of this formula on the Home Screen, replacing x_n with **Ans**. Press **[ENTER]**.
5. Press **[ENTER]** repeatedly to execute the formula in step 4 with the updated **Ans**. Continue until the answer has converged to the desired number of decimal places.