

Math 111, Spring 2002  
Programming Newton's Method on the TI83

1. Hit "MODE". On the fourth line, highlight "Seq" and hit "ENTER". This puts your calculator into its "sequence" mode of operation.
2. Hit "Y=". In the "nMin=" slot, enter 1. Under "u(n)", enter the formula for Newton's method. However, instead of entering  $x_n$ , you should enter  $u(n-1)$ . To do so, hit "2nd" and then 7 (this gives you a u), then left parentheses "(", "n-1" (use the "X,T,θ,n" button for n), and then right parentheses ")".

For example, in order to enter the formula  $x_n = x_{n-1} - \frac{f(x_{n-1})}{f'(x_{n-1})}$  for  $f(x) = \sin x + e^{-x}$ , you enter the following:  $u(n)=u(n-1)-(sin(u(n-1))+e^(-u(n-1)))/(cos(u(n-1))-e^(-u(n-1)))$ .

Finally, under "u(nMin)", enter your starting guess  $x_0$ .

3. Go to "TBLSET" by pressing "2nd" and then "WINDOW". Set "TblStart" to be 1, "ΔTbl" to be 1, and set both "Indpnt" and "Depend" to "Auto" by highlighting them and pressing "ENTER".
4. You may display the results of Newton's method in one of two ways (perhaps more). The first option is to go to a table of values by hitting "2nd" "GRAPH". This will display the first several iterations of Newton's method, but only to about 5 digits of precision. To get a few more digits of precision, simply hit "GRAPH" (you will have to make sure that your xmin, xmax, ymin, and ymax under "WINDOW" are set properly for the range of  $n$  and  $y$ 's you wish to see). If you hit "TRACE" in the "GRAPH" window and scroll through the points using the right arrow, you can see the results of successive Newton steps to about 8 digits of precision.

There may be a better way to do this, but this is the best I'm aware of!