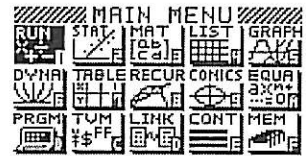


Classroom Activities

Newton-Raphson Method

Finding the solution to an equation such as $f(x) = 0$, using the derivative and tangent to achieve better and better approximations to the solution of $f(x) = 0$.

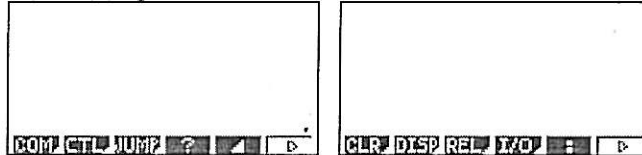
Formula used is: $x_{n+1} = x_n - f(x_n) / f'(x_n)$



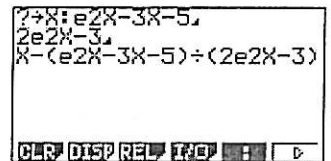
'Quick Access' Hints

◀ and : , these can be accessed via the **PRGM** menu by pressing **SHIFT VARS** then **F4** for the ? and **F6** then **F5** for the :

? **SHIFT** **VARS** **F4**
 ◀ **SHIFT** **VARS** **F5**
 : **SHIFT** **VARS** **F6** **F5**
 Ans **SHIFT** **(-)**



Example: Find a solution to $e^{2x} - 3x - 5 = 0$, with the initial value of $x = 0$
 [Note: here that $f(x) = e^{2x} - 3x - 5$ and that $f'(x) = 2e^{2x} - 3$]



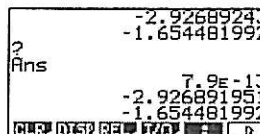
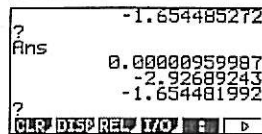
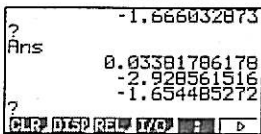
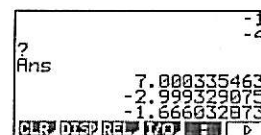
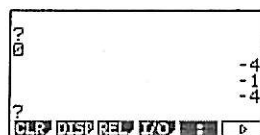
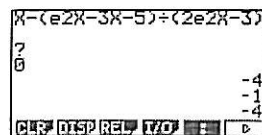
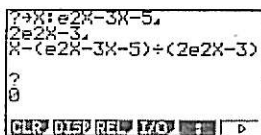
Answer: Type in the following (as shown on the right)

Now, press **EXE** and the ? appears.

Enter in the initial value, i.e. $x = 0$, then press **EXE** three times. This displays = $f(x_n)$ then $f'(x_n)$ and lastly the next best approximation, x_{n+1}

Repeat this process until there is a 'matching' x_{n+1} .

N.B. Don't forget to record the iterations as you progress closer to the solution.



matching x_{n+1}

Answer: $x = -1.654481992$ Hence, a solution to $e^{2x} - 3x - 5 = 0$

[N.B. Other Newton-Raphson worksheets are available on the Monaco website.]