Section 3.8

Newton's Method

NEWTON'S METHOD

Newton's Method is an ***algorithm*** (procedure) for finding roots (solutions) to the equation
$$f(x) = 0$$
provided f is a differentiable function.

THE ALGORITHM

Let $f(x)$ be a differentiable function and let x_1 be an initial approximation to the root r of the equation $f(x) = 0$.

Compute $x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$

for $n = 1, 2, 3, \ldots$

Write $\lim\limits_{n \to \infty} x_n = r$, if the limit exists.

APPLYING NEWTON'S METHOD ON THE TI-83/84

1. Enter the original function as **Y1** and its derivative as **Y2**.
2. Store the first guess as *x* by entering the guess, pressing **STO**, pressing **X,t,θ,n**, then press **ENTER**.
3. Enter X−Y$_1$(X)/Y$_2$(X)→X. To enter Y$_1$, press **VARS**, arrow over to **Y-Vars**, select **1:Function**, then select **1:Y$_1$**. Use a similar process to enter Y$_2$.
4. Repeatedly press **ENTER** until the desired accuracy is reached.