LESSON 6: NEWTON'S METHOD

Objective:	1. To use Newton's Method to approximate the zeros of a function

Newton's Method

If f is continuous on [a,b] and differentiable on (a,b), then $x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$ can be used to approximate the real zeros.

Examples

1. The function $y = x^2 - 2$ has roots of $\pm\sqrt{2}$. Use two iterations of Newton's Method and an initial guess of 1 to approximate the value of $\sqrt{2}$.

n	x_n	$f(x_n)$	$f'(x_n)$	$x_n - \dfrac{f(x_n)}{f'(x_n)}$
1				
2				

Newton's Method cont.

2. The function $f(x) = x^3 - 8x - 5$ has roots in the vicinity of –2, 0, and 3. Use successive approximations with Newton's Method to find them correct to 3 decimal places.

Short cut: $f(x)$ in Y_1

$f'(x)$ in Y_2

On home screen:

$\# \rightarrow x$

$x - \frac{Y_1}{Y_2} \rightarrow x$

3. The function $f(x) = x^5 - x^2 - 4$ has only one real root and it is in the vicinity of x = 1. Use successive approximations with Newton's Method to find the root correct to 3 decimal places.