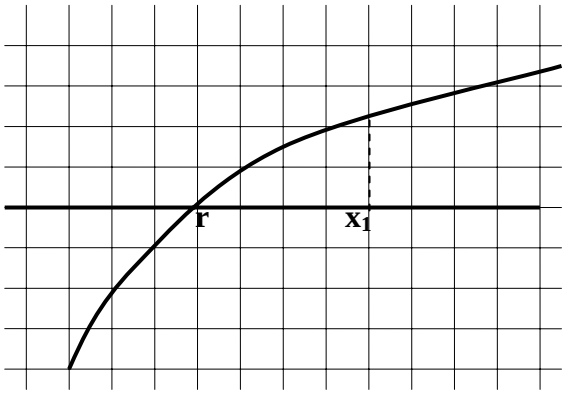
MA 181 Newton's Method
Section 4.8



For the curve to the right:

(1) Draw a line tangent to the curve at the point $(x_1, f(x_1))$.

(2) Extend that tangent line so that it intersects the x-axis. Call the x-intercept of the tangent line x_2.

(3) Write the equation of the tangent line at $(x_1, f(x_1))$ and use it to obtain a formula for x_2 as a function of x_1.

(4) Draw a new line tangent to the curve at the point $(x_2, f(x_2))$.

(5) Extend the tangent line at $(x_2, f(x_2))$ so that it intersects the x-axis. Call the x-intercept of this tangent line x_3.

(6) Write the equation of the tangent line at $(x_2, f(x_2))$ and use it to obtain a formula for x_3 as a function of x_2.

(7) What is happening to the values x_1, x_2, and x_3 in terms of their relationship to r, the x-intercept of f(x)?

(8) Guess the formula for x_{n+1}, the x-intercept of the $(n+1)st$ tangent line, as a function of x_n, the x-intercept of the nth tangent line.

The easiest way to use Newton's Method on a TI calculator is as follows:

(1) Store $f(x)$ as Y1 and $f'(x)$ as Y2.

(2) Enter $x_1 \to x$ (using the STO key).

(3) Enter $x - \frac{y_1}{y_2} \to x$ repeatedly. Stop when the values shown on the calculator stop changing.