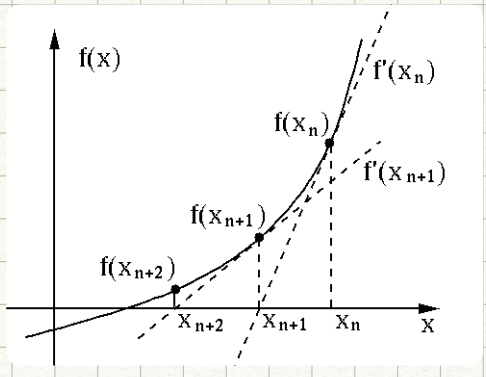
NEWTON'S METHOD

Newton's Suggestion: if we can't solve $f(x)=0$, replace $f(x)$ w/ linear approx. and find x-intercept of the line. Take that x-coord to be new center of linear approx & repeat.



ex. Find root of equation $x^3-2x-5=0$.

→ start w/ bisection to find starting point

$f(0) = -5$
$f(1) = -6$
$f(2) = -1$
$f(3) = 16$

so root in $[2,3]$

Linearize at $x_0 = 2$!

$f(x) = x^3-2x-5$ | $f(2) = -1$
$f'(x) = 3x^2-2$ | $f(2) = 10$

$L_2(x) = -1 + 10(x-2)$
$= 10x - 21$

$L_2(x) = 0$ when $x = 2.1$

$f(2.1) = 0.061$
$f'(2.1) = 11.23$

$L_{2.1}(x) = 0.061 + 11.23(x-2.1)$
$= 11.23x - 23.522$

$L_{2.1}(x) = 0$ when $x = 2.09457$

... etc.