Optimization problems (section 4.5) and other methods of calculus require finding roots, -intercepts, solutions. Algebra does this, but it cannot solve every equation. *Newton’s method* lets us find the approximate roots of many equations.

# Newton’s Method

Newton’s method, Newton-Raphson method (method) – an iterative method for solving roots of equations by successively approximating the value of .

**Note**: Newton’s method works best on a computer or a programmable calculator.

## What Newton’s Method Does

Newton’s method gets closer and closer (*converges*) to the actual root of a function by following tangent lines from the function to the -intercept line again and again. See Figure 1.

Figure

## How to Use Newton’s Method

To approximate the roots of a function ,

1. Start with and being some number in ’s domain.
2. Take the derivative at , which is .
3. Take the value of at , which is .
4. The next -number, .
5. Repeat steps 2-4 until enough precision of is achieved.

**Warning**: Newton’s method is not guaranteed to converge to a value of .

# How Would You Answer?

* What is Newton’s method? How does it work?
* Why is Newton’s method not guaranteed to approximate a function’s root? Where might this happen?