Newton's Method

The Invisible College

September 28, 2015

Figure 1: This is Isaac Newton.

In numerical analysis, Newton's method (also known as the Newton-Raphson method), named after Isaac Newton and Joseph Raphson, is a method for finding successively better approximations to the roots (or zeroes) of a real-valued function.

$$f(a) = 0$$

1. Start with a guess for x.
2. Evaluate the function f(x).
3. If f(x)<(small threshold) then x is your root!
4. Determine the slope of the tangent line at x.
5. Extrapolate the x value where the tangent line would cross the x-axis.
6. Repeat starting at step 2.

WRITE THE ALGORITHM IN PYTHON

Here is a starter file.

```
#WE ARE LOOKING FOR THE POSITIVE ROOT
#OF THE FUNCTION f(x)=3-x*x

#this is the increment for determining the slope
#of the tangent line
dx=0.01

#this is the threshold
e=0.02

#this is the initial guess
x=1.0

while abs(3.0-x*x)>e:
    f=3.0-x*x
    f1=3.0-(x+dx)*(x+dx)
    s=(f1-f)/dx
    x=x+(-f)/s

print x
```