牛顿法

1.先求一阶导数

2.再求二阶导数

3.x1=x0-f''(x0)/f'''(x0)

Example

Using Newton's method, find the minimum of $f(x) = x^2 + 54/x$.
The initial value is $x_0 = 2$. Stop when $|x_{n+1} - x_n| < 10^{-5}$.

We have

$f'(x) = 2x - 54/x^2$

$f''(x) = 2 + 108/x^3$

Thus,

$x_1 = x_0 - f'(x_0) / f''(x_0)$

$= 2 - (2(2) - 54/2^2) / (2 + 108/2^3)$

$= 2.6129$

The iterations are shown below

n	x_n	x_{n+1}	$\|x_{n+1} - x_n\|$
0	2	2.612903	0.612903
1	2.612930	2.946104	0.333201
2	2.946104	2.99902	0.0529154
3	2.999020	2.999999	0.000979
4	2.99999	2.999999	0.000000

0.00001

Take $x^* = x_5 = 2.99999 \approx 3.0$