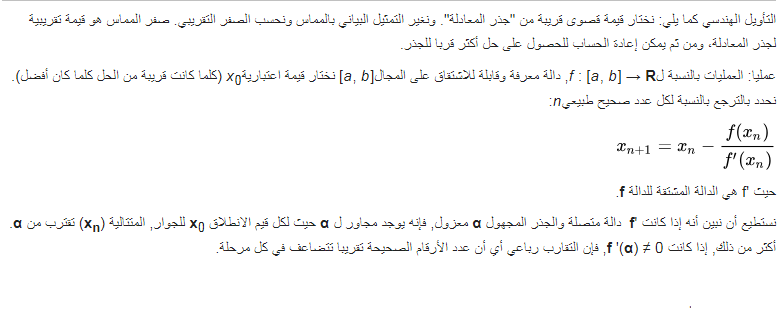
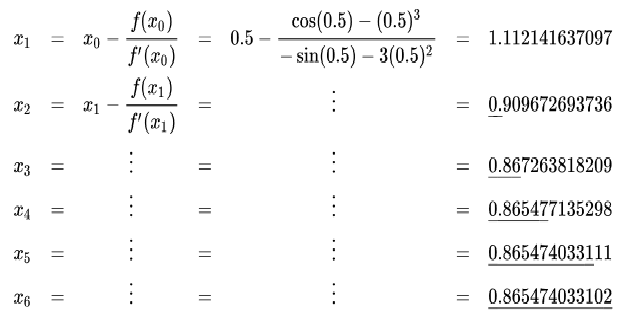
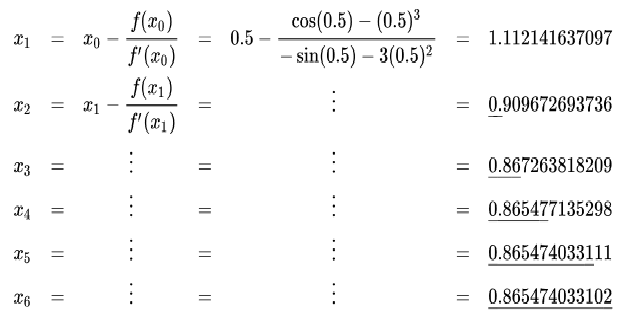
في التحليل العددي، **طريقة**[**نيوتن**](https://ar.wikipedia.org/wiki/%D9%86%D9%8A%D9%88%D8%AA%D9%86) ([بالإنجليزية](https://ar.wikipedia.org/wiki/%D9%84%D8%BA%D8%A9_%D8%A5%D9%86%D8%AC%D9%84%D9%8A%D8%B2%D9%8A%D8%A9):Newton's method) أو **طريقة نيوتن-رافسون**([بالإنجليزية](https://ar.wikipedia.org/wiki/%D9%84%D8%BA%D8%A9_%D8%A5%D9%86%D8%AC%D9%84%D9%8A%D8%B2%D9%8A%D8%A9): Newton–Raphson method) هي [خوارزمية](https://ar.wikipedia.org/wiki/%D8%AE%D9%88%D8%A7%D8%B1%D8%B2%D9%85%D9%8A%D8%A9) فعالة لإيجاد جذور تابع حقيقي. لذلك تعتبر مثالا لخوارزميات إيجاد الجذور. يمكن استخدامها لإيجاد الحدود العليا والحدود الدنيا لمثل هذه التوابع، عن طريق إيجاد جذور المشتق الأول للتابع.

**الطريقة**

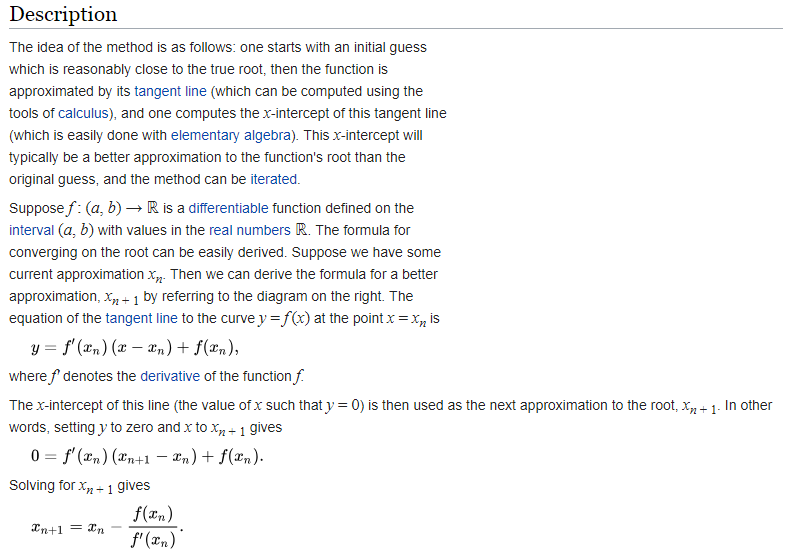


{\displaystyle {\begin{matrix}x\_{1}&=&x\_{0}-{\dfrac {f(x\_{0})}{f'(x\_{0})}}&=&0.5-{\dfrac {\cos(0.5)-(0.5)^{3}}{-\sin(0.5)-3(0.5)^{2}}}&=&1.112141637097\\x\_{2}&=&x\_{1}-{\dfrac {f(x\_{1})}{f'(x\_{1})}}&=&\vdots &=&{\underline {0.}}909672693736\\x\_{3}&=&\vdots &=&\vdots &=&{\underline {0.86}}7263818209\\x\_{4}&=&\vdots &=&\vdots &=&{\underline {0.86547}}7135298\\x\_{5}&=&\vdots &=&\vdots &=&{\underline {0.8654740331}}11\\x\_{6}&=&\vdots &=&\vdots &=&{\underline {0.865474033102}}\end{matrix}}}

In [numerical analysis](https://en.wikipedia.org/wiki/Numerical_analysis), **Newton's method** (also known as the **Newton–Raphson method**), named after [Isaac Newton](https://en.wikipedia.org/wiki/Isaac_Newton) and [Joseph Raphson](https://en.wikipedia.org/wiki/Joseph_Raphson), is a method for finding successively better approximations to the [roots](https://en.wikipedia.org/wiki/Root_of_a_function) (or zeroes) of a [real](https://en.wikipedia.org/wiki/Real_number)-valued [function](https://en.wikipedia.org/wiki/Function_(mathematics)). It is one example of a [root-finding algorithm](https://en.wikipedia.org/wiki/Root-finding_algorithm).

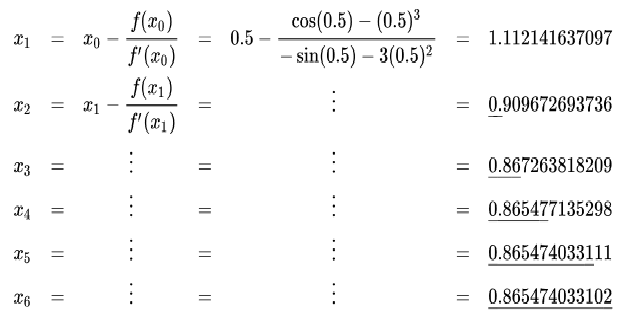
The Newton–Raphson method in one variable is implemented as follows:

The method starts with a function *f* defined over the [real numbers](https://en.wikipedia.org/wiki/Real_number) *x*, the function's [derivative](https://en.wikipedia.org/wiki/Derivative) *f ′*, and an initial guess *x*0 for a [root of the function](https://en.wikipedia.org/wiki/Zero_of_a_function) *f*. If the function satisfies the assumptions made in the derivation of the formula and the initial guess is close, then a better approximation *x*n is



**Example :- find the root by using Newton Raphson method for x0=0.5**

**cos(*x*) = *x*3**



It's required to solve that equation: f(x) = x.^3 - 0.165\*x.^2 + 3.993\*10.^-4 using Newton-Raphson Method with initial guess (x0 = 0.05) to 3 iterations and also, plot that function.

The following code implements the [Newton-Raphson method](http://en.wikipedia.org/wiki/Newton) for your problem:

x = 0.05;

x\_old = 100;

x\_true = 0.0623776;

iter = 0;

while abs(x\_old-x) > 10^-3 && x ~= 0

x\_old = x;

x = x - (x^3 - 0.165\*x^2 + 3.993\*10^-4)/(3\*x^2 - 0.33\*x);

iter = iter + 1;

fprintf('Iteration %d: x=%.20f, err=%.20f\n', iter, x, x\_true-x);

pause;

end

You can plot the function with, for example:

x = -10:0.01:10;

f = x.^3 - 0.165\*x.^2 + 3.993\*10^-4;

figure;

plot(f)

grid on

Find a real root of the function f(x)=tanh(x^2 - 9)using at least 3 iterations, using Newton-Raphson method. x= 3.2 show each iteration graphically.

clc

clear all

x=3.2;

fx=tanh(x^2-9);

iter=5;

pog=0.01;

br=1;

while br<10;

xk= x-((tanh(x^2-9))/(-2\*x\*(tanh(x^2 - 9)^2 - 1)));

fprintf ('x=%g\txk=%g\t%g\n', x,xk, abs(xk-x))

if pog>abs(xk-x);

break

end

x=xk;

br=br+1;

end

**المصادر**

1. Ryaben'kii, Victor S.; Tsynkov, Semyon V. (2006), [*A Theoretical Introduction to Numerical Analysis*](https://books.google.com/books?id=V8gWP031-hEC&pg=PA243), CRC Press, p. 243, [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*9781584886075*](https://en.wikipedia.org/wiki/Special:BookSources/9781584886075).
2. Kendall E. Atkinson, *An Introduction to Numerical Analysis*, (1989) John Wiley & Sons, Inc, [ISBN](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [0-471-62489-6](https://en.wikipedia.org/wiki/Special:BookSources/0-471-62489-6)
3. *Kaw, Autar; Kalu, Egwu (2008). "Numerical Methods with Applications" (1st ed.)*.