

Package: NLRoot (via r-universe)

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Type Package

Title searching for the root of equation

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Description This is a package which can help you search for the root of a equation.

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Repository <https://zhengsengui.r-universe.dev>

RemoteUrl <https://github.com/cran/NLRoot>

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BFfzero

Bisection Method

Description

Bisection Method to Find the Root of Nonlinear Equation

Usage

```
BFfzero(f, a, b, num = 10, eps = 1e-05)
```

Arguments

f	the objective function which we will use to solve for the root
a	minimum of the interval which contains the root from Bisection Method
b	maximum of the interval which contains the root from Bisection Method
num	the number of sections that the interval which from Bisection Method
eps	the level of precision that $ x^{(k+1)}-x^{(k)} $ should be satisfied in order to get the ideal real root. $eps=1e-5$ when it is default

Details

Be careful to choose a & b. If not we maybe fail to find the root

Value

a root of the objective function which between the interval from a to b

Note

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Author(s)

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References

Luis Torgo (2003) Data Mining with R:learning by case studies. LIACC-FEP, University of Porto

See Also

[NDHfzero](#),[NIMfzero](#),[SMfzero](#)

Examples

```

f<-function(x){x^3-x-1};f1<-function(x){3*x^2-1};

Bffzero(f,0,2)
##---- Should be DIRECTLY executable !! ----
##-- ==> Define data, use random,
##-- or do help(data=index) for the standard data sets.

## The function is currently defined as
function (f, a, b, num = 10, eps = 1e-05)
{
  h = abs(b - a)/num
  i = 0
  j = 0
  a1 = b1 = 0
  while (i <= num) {
    a1 = a + i * h
    b1 = a1 + h
    if (f(a1) == 0) {
      print(a1)
      print(f(a1))
    }
    else if (f(b1) == 0) {
      print(b1)
      print(f(b1))
    }
    else if (f(a1) * f(b1) < 0) {
      repeat {
        if (abs(b1 - a1) < eps)
          break
        x <- (a1 + b1)/2
        if (f(a1) * f(x) < 0)
          b1 <- x
        else a1 <- x
      }
      print(j + 1)
      j = j + 1
      print((a1 + b1)/2)
      print(f((a1 + b1)/2))
    }
    i = i + 1
  }
  if (j == 0)
    print("finding root is fail")
  else print("finding root is successful")
}

```

Description

Newton Downhill Method to Find the Root of Nonlinear Equation

Usage

```
NDHfzero(f, f1, x0 = 0, num = 1000, eps = 1e-05, eps1 = 1e-05)
```

Arguments

f	the objective function which we will use to solve for the root
f1	the derivative of the objective function (say f)
x0	the initial value of Newton iteration method or Newton downhill method
num	num the number of sections that the interval which from Brent's method divide into. num=1000 when it is default
eps	the level of precision that $ x(k+1)-x(k) $ should be satisfied in order to get the idear real root. eps=1e-5 when it is default
eps1	the level of precision that $ f(x) $ should be satisfied, where x comes from the program. when it is not satisfied we will fail to get the root

Details

eps1 of precision that $|f(x)|$ should be satisfied, where x comes from the program. when it is not satisfised we will fail to get the root

Value

a root of the objective function

Note

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References

Luis Torgo (2003) Data Mining with R:learning by case studies. LIACC-FEP, University of Porto

See Also

[BFfzero](#),[NIMfzero](#),[SMfzero](#)

Examples

```
f<-function(x){x^3-x-1};f1<-function(x){3*x^2-1};
NDHfzero(f,f1,2)

##---- Should be DIRECTLY executable !! ----
##-- ==> Define data, use random,
##-- or do help(data=index) for the standard data sets.

## The function is currently defined as
function (f, f1, x0 = 0, num = 1000, eps = 1e-05, eps1 = 1e-05)
{
  a = x0
  b = a - f(a)/f1(a)
  i = 0
  while ((abs(b - a) > eps)) {
    c = 1
    j = 0
    while (abs(f(b)) >= abs(f(a))) {
      b = a - c * f(a)/f1(a)
      j = j + 1
      c = 1/(2^j)
    }
    a = b
    b = a - f(a)/f1(a)
    c = 1
    j = 0
    while (abs(f(b)) >= abs(f(a))) {
      b = a - c * f(a)/f1(a)
      j = j + 1
      c = 1/(2^j)
    }
    i = i + 1
  }
  print(b)
  print(f(b))
  if (abs(f(b)) < eps1) {
    print("finding root is successful")
  }
  else print("finding root is fail")
}
}
```

NIMfzero

Newton iteration method

Description

Newton iteration method to Find the Root of Nonlinear Equation.

Usage

```
NIMfzero(f, f1, x0 = 0, num = 100, eps = 1e-05, eps1 = 1e-05)
```

Arguments

f	the objective function which we will use to solve for the root
f1	the derivative of the objective function (say f)
x0	the initial value of Newton iteration method or Newton downhill method
num	the number of sections that the interval which from Brent's method divide into. num=100 when it is default
eps	the level of precision that $ x(k+1)-x(k) $ should be satisfied in order to get the idear real root. eps=1e-5 when it is default
eps1	the level of precision that $ f(x) $ should be satisfied, where x comes from the program. when it is not satisfied we will fail to get the root

Details

the root we found out is based on the x0. So it is better to choose x0 carefully

Value

the root of the function

Note

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References

Luis Torgo (2003) Data Mining with R:learning by case studies. LIACC-FEP, University of Porto

See Also

[BFfzero](#),[NDHfzero](#),[SMfzero](#)

Examples

```
f<-function(x){x^3-x-1};f1<-function(x){3*x^2-1};
NIMfzero(f,f1,0)

##---- Should be DIRECTLY executable !! ----
##-- ==> Define data, use random,
##-- or do help(data=index) for the standard data sets.

## The function is currently defined as

function (f, f1, x0 = 0, num = 100, eps = 1e-05, eps1 = 1e-05)
{
```

```

a = x0
b = a - f(a)/f1(a)
i = 0
while ((abs(b - a) > eps) & (i < num)) {
    a = b
    b = a - f(a)/f1(a)
    i = i + 1
}
print(b)
print(f(b))
if (abs(f(b)) < eps1) {
    print("finding root is successful")
}
else print("finding root is fail")
}

```

SMfzero

Secant Method

Description

Secant Method to Find the Root of Nonlinear Equation.

Usage

SMfzero(f, x1, x2, num = 1000, eps = 1e-05, eps1 = 1e-05)

Arguments

f	the objective function which we will use to solve for the root
x1	the initial value of Secant Method
x2	the initial value of Secant Method
num	the number of sections that the interval which from Brent's method divide into. num=1000 when it is default
eps	the level of precision that $ x(k+1)-x(k) $ should be satisfied in order to get the idear real root. eps=1e-5 when it is default
eps1	the level of precision that $ f(x) $ should be satisfied, where x comes from the program. when it is not satisfied we will fail to get the root

Details

Be careful to choose x1 & x2.if not we maybe fail to get the root

Value

the root of the function

Note

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Author(s)

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References

Luis Torgo (2003) Data Mining with R:learning by case studies. LIACC-FEP, University of Porto

See Also

[BFfzero](#),[NDHfzero](#),[NIMfzero](#)

Examples

```
f<-function(x){x^3-x-1};f1<-function(x){3*x^2-1};
SMfzero(f,0,2)

##---- Should be DIRECTLY executable !! ----
##-- ==> Define data, use random,
##-- or do help(data=index) for the standard data sets.

## The function is currently defined as

function (f, x1, x2, num = 1000, eps = 1e-05, eps1 = 1e-05)
{
  i = 0
  while ((abs(x1 - x2) > eps) & (i < num)) {
    c = x2 - f(x2) * (x2 - x1)/(f(x2) - f(x1))
    x1 = x2
    x2 = c
    i = i + 1
  }
  print(x2)
  print(f(x2))
  if (abs(f(x2)) < eps1) {
    print("finding root is successful")
  }
  else print("finding root is fail")
}
```


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