Mètode de Newton

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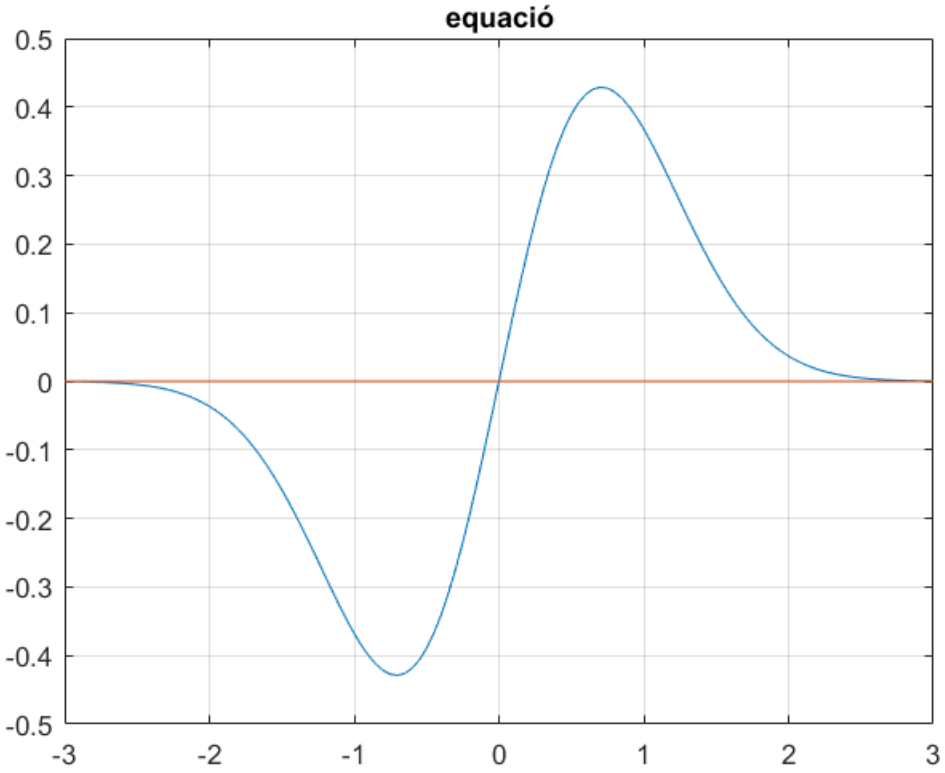
Convergència lenta

Gràfica

```
clear, clc, format short g
f=@(x)x.*exp(-x.^2)
df=@(x)exp(-x.^2).*(1-2*x.^2);
t=-3:0.05:3;
plot(t,f(t),t,zeros(size(t))),grid,title('equació')
fprintf('\n  \n')
```

```
f =
    @(x)x.*exp(-x.^2)
```



Iteracions convergent

```
format short g
x0=0.4; tol=eps;
root = new_newton(f,df,x0,tol,10)
```

```
 iteration |  x_n   |   |f(x_n)|  |    tolx
        ------------------------------------------------
taula =
            0          0.4      0.34086           1
            1     -0.18824      0.18168     0.58824
            2     0.014357     0.014354     0.20259
            3  -5.9207e-06   5.9207e-06    0.014363
            4   4.1509e-16   4.1509e-16   5.9207e-06
            5            0            0   4.1509e-16
            6            0            0           0


root =
     0
```

Iteracions estacionari

```
format short g
x0=0.5; tol=eps;
root = new_newton(f,df,x0,tol,10)
```

```
 iteration |  x_n   |   |f(x_n)|  |    tolx
        ------------------------------------------------
taula =
            0          0.5       0.3894           1
            1         -0.5       0.3894           1
            2          0.5       0.3894           1
            3         -0.5       0.3894           1
            4          0.5       0.3894           1
            5         -0.5       0.3894           1
            6          0.5       0.3894           1
            7         -0.5       0.3894           1
            8          0.5       0.3894           1
            9         -0.5       0.3894           1
           10          0.5       0.3894           1


root =
          0.5
```

Iteracions divergent

```
format short g
x0=0.6; tol=eps;
root = new_newton(f,df,x0,tol,10)
```

```
 iteration |  x_n   |   |f(x_n)|  |    tolx
```

```
        ------------------------------------------
taula =
           0          0.6      0.41861           1
           1      -1.5429      0.14273      2.1429
           2      -1.9531     0.043059     0.41025
           3      -2.2477     0.014374     0.29462
           4      -2.4946    0.0049473     0.24688
           5      -2.7125    0.0017293     0.21794
           6      -2.9103   0.00061023     0.19777
           7      -3.0929   0.00021672     0.18258
           8      -3.2635   7.7328e-05     0.17058
           9      -3.4242   2.7689e-05     0.16076
          10      -3.5768   9.9424e-06     0.15252


root =
      -3.5768
```

Exemple $x_0 = 0.4$ convergent, $x_0 = 0.5$ estacionari i $x_0 = 0.6$ divergent per a $xe^{-x^2} = 0$

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