Exercici 1 - Teoria dimarts 6 de març 2018

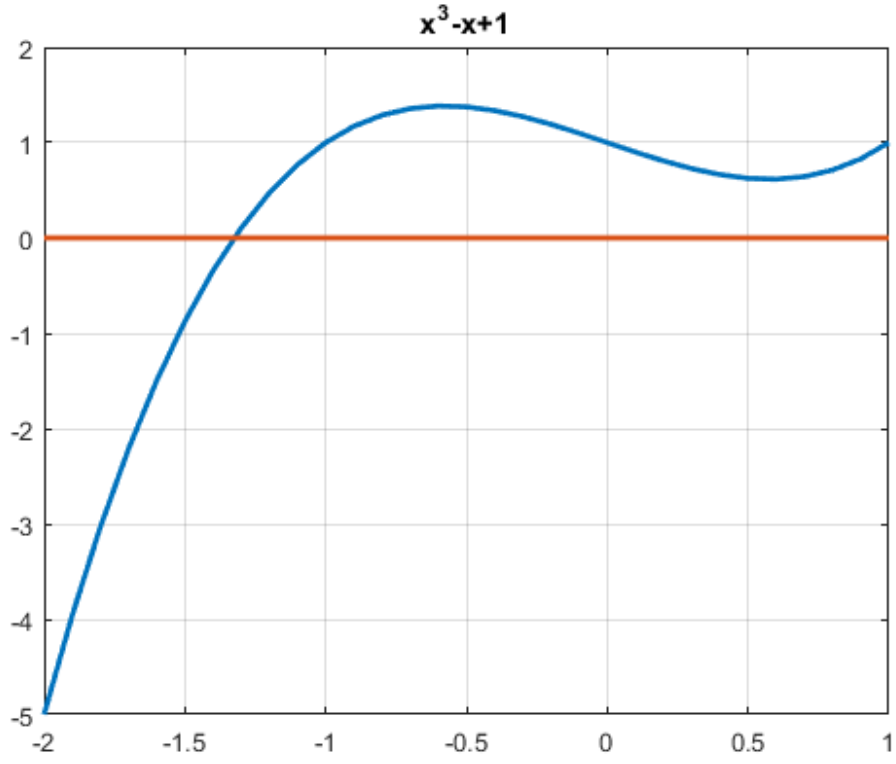
by M. Àngela Grau Gotés

Contents


```
clc, clear all, format long g
```

Gràfica

```
f=@(x)x.^3-x+1;
figure(1)
t=-2:0.1:1;
plot(t,f(t),t,zeros(size(t)),'LineWidth',2),grid,title('x^3-x+1')
```



Mètode de la bisecció

```
a=-2; b=-1; tol = 0.001;
QP1718_bisec
```

```
iteration       |          a                  |          x                  |         b
-------------------------------------------------------------------------------------------------
    1           |         -2.00000           |         -1.50000           |         -1.00000
```

```
     2          |         -1.50000          |         -1.25000          |         -1.00000
     3          |         -1.50000          |         -1.37500          |         -1.25000
     4          |         -1.37500          |         -1.31250          |         -1.25000
     5          |         -1.37500          |         -1.34375          |         -1.31250
     6          |         -1.34375          |         -1.32813          |         -1.31250
     7          |         -1.32813          |         -1.32031          |         -1.31250
     8          |         -1.32813          |         -1.32422          |         -1.32031
     9          |         -1.32813          |         -1.32617          |         -1.32422
    10          |         -1.32617          |         -1.32520          |         -1.32422
    11          |         -1.32520          |         -1.32471          |         -1.32422
```

```
iteration       |           x               |           f(x)            |         longitud
-------------------------------------------------------------------------------------------------
     1          |         -1.50000          |         -0.87500          |       0.50000000
     2          |         -1.25000          |          0.29688          |       0.25000000
     3          |         -1.37500          |         -0.22461          |       0.12500000
     4          |         -1.31250          |          0.05151          |       0.06250000
     5          |         -1.34375          |         -0.08261          |       0.03125000
     6          |         -1.32813          |         -0.01458          |       0.01562500
     7          |         -1.32031          |          0.01871          |       0.00781250
     8          |         -1.32422          |          0.00213          |       0.00390625
     9          |         -1.32617          |         -0.00621          |       0.00195313
    10          |         -1.32520          |         -0.00204          |       0.00097656
    11          |         -1.32471          |          0.00005          |       0.00048828
-------------------------------------------------------------------------------------------------
```

Mètode de la regula falsi

```
clear, f=@(x)x.^3-x+1;
a=-2; b=-1; tol = 0.00005;
QP1718_regula
```

```
iteration       |           a               |           x               |           b
-------------------------------------------------------------------------------------------------
     1          |         -2.00000          |         -1.50000          |         -1.00000
     2          |         -2.00000          |         -1.16667          |         -1.00000
     3          |         -2.00000          |         -1.25311          |         -1.16667
     4          |         -2.00000          |         -1.29344          |         -1.25311
     5          |         -2.00000          |         -1.31128          |         -1.29344
     6          |         -2.00000          |         -1.31899          |         -1.31128
     7          |         -2.00000          |         -1.32228          |         -1.31899
     8          |         -2.00000          |         -1.32368          |         -1.32228
     9          |         -2.00000          |         -1.32428          |         -1.32368
    10          |         -2.00000          |         -1.32453          |         -1.32428
    11          |         -2.00000          |         -1.32464          |         -1.32453
    12          |         -2.00000          |         -1.32468          |         -1.32464
    13          |         -2.00000          |         -1.32470          |         -1.32468
    14          |         -2.00000          |         -1.32471          |         -1.32470
```

```
iteration       |           x               |           f(x)            |         tolx
-------------------------------------------------------------------------------------------------
     1          |         -1.50000          |         -0.87500          |          0.00000
     2          |         -1.16667          |          0.57870          |          0.00000
     3          |         -1.25311          |          0.28536          |          0.33333
     4          |         -1.29344          |          0.12954          |          0.08645
     5          |         -1.31128          |          0.05659          |          0.04033
     6          |         -1.31899          |          0.02430          |          0.01784
     7          |         -1.32228          |          0.01036          |          0.00771
     8          |         -1.32368          |          0.00440          |          0.00329
     9          |         -1.32428          |          0.00187          |          0.00140
```

```
    10          |         -1.32453          |          0.00079          |          0.00060
    11          |         -1.32464          |          0.00034          |          0.00025
    12          |         -1.32468          |          0.00014          |          0.00011
    13          |         -1.32470          |          0.00006          |          0.00005
    14          |         -1.32471          |          0.00003          |          0.00002
-------------------------------------------------------------------------------------------------
```

Mètode de Newton

```
clear, f=@(x)x.^3-x+1;
df=@(x)3.*x.^2-1;
a=-2; tol = 0.00005;
QP1718_newton
```

```
iteration       |           x               |           f(x)            |         f(x)/df(x)
-------------------------------------------------------------------------------------------------
    1           |         -2.00000          |        -5.00000000        |        -0.45454545
    2           |         -1.54545          |        -1.14575507        |        -0.18583963
    3           |         -1.35961          |        -0.15370493        |        -0.03381357
    4           |         -1.32580          |        -0.00462492        |        -0.00108230
    5           |         -1.32472          |        -0.00000466        |        -0.00000109
-------------------------------------------------------------------------------------------------
```

Mètode de la secant

```
clear, f=@(x)x.^3-x+1;
a=-2; b=-1; tol = 0.00005;
QP1718_secant
```

```
iteration       |           x               |           f(x)            |         tolx
-------------------------------------------------------------------------------------------------
    1           |         -2.00000          |        -5.00000000        |         1.00000000
    2           |         -1.00000          |         1.00000000        |         1.00000000
    3           |         -1.16667          |         0.57870370        |         0.16666667
    4           |         -1.39560          |        -0.32263052        |         0.22893773
    5           |         -1.31366          |         0.04668748        |         0.08194773
    6           |         -1.32402          |         0.00299114        |         0.01035945
    7           |         -1.32473          |        -0.00003110        |         0.00070913
    8           |         -1.32472          |         0.00000002        |         0.00000730
-------------------------------------------------------------------------------------------------
```

Mètodes de la iteració simple

mètode iteratiu 1

```
clear
f=@(x)x.^3-x+1;
g=@(x)nthroot((x-1),3);
dg1=@(x)1./(3.*((x-1).^(2/3)));
a=-2; b=-1; tol = 0.00005;
if abs(dg1(a)) < 1
    QP1718_punt_fix
else
    fprintf('\nMètode divergent\n')
```

```
    fprintf('\n\n\n');
end
```

```
iteration       |          xns                |          f(xns)             |         tolx
-------------------------------------------------------------------------------------------------------
    0           |       -2.00000000           |        -5.00000000          |         1.00000000
    1           |       -1.44224957           |        -0.55775043          |         0.55775043
    2           |       -1.34667670           |        -0.09557287          |         0.09557287
    3           |       -1.32887589           |        -0.01780082          |         0.01780082
    4           |       -1.32550727           |        -0.00336861          |         0.00336861
    5           |       -1.32486787           |        -0.00063940          |         0.00063940
    6           |       -1.32474643           |        -0.00012144          |         0.00012144
    7           |       -1.32472337           |        -0.00002307          |         0.00002307
-------------------------------------------------------------------------------------------------------
```

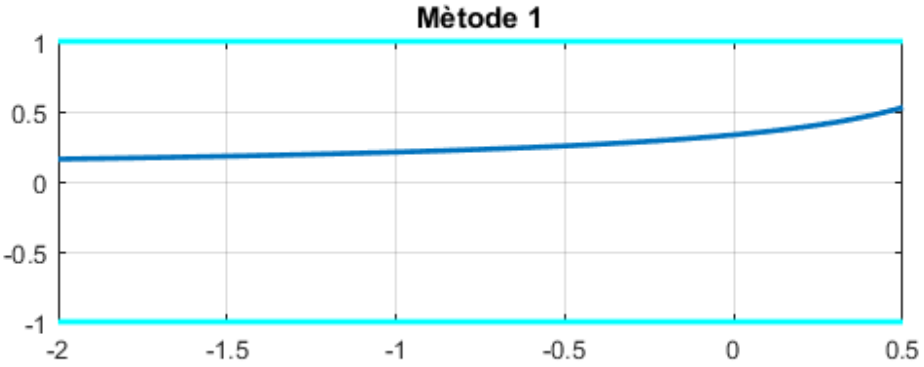
mètode iteratiu 2

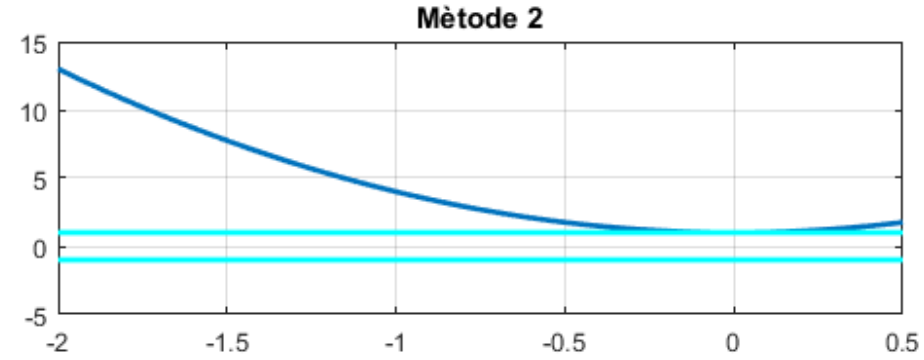
```
clear
f=@(x)x.^3-x+1;
g=@(x)x.^3+1;
dg2=@(x)3.*x.^2+1;
a=-2; b=-1; tol = 0.00005;
if abs(dg2(a)) < 1
    for i=1:5
        QP1718_punt_fix
    end
else
    fprintf('\nMètode divergent\n')
    fprintf('\n\n\n');
end
```

```
Mètode divergent
```

Estudi convergència

```
t=-2:0.05:0.5;
g=@(x)nthroot((x-1),3);
dg1=@(x)1./(3*g(x).^2);
dg2=@(x)3.*x.^2+1;
figure(2)
subplot(2,1,1),plot(t,-ones(size(t)),'c',t,dg1(t),t,ones(size(t)),'c','LineWidth',2),grid,title('Mètode 1')
subplot(2,1,2),plot(t,-ones(size(t)),'c',t,dg2(t),t,ones(size(t)),'c','LineWidth',2),grid,title('Mètode 2')
```





Published with MATLAB® R2015b