
Uppg 2.7 i Exempelsamlingen med intervallhalvering

Dag Lindbo, 2011-01-25

```
clear all, close all

f = @(x) 10*x.^(1/10) - x - cos(x) - exp(-x);
t = linspace(0,25,1000);
plot(t,f(t)), grid on

a = 5; % startgissningar
b = 20;

tol = 1e-13; % tolerans
x_vec = []; % tom vektor
while b-a > tol

    x = (a+b)/2; %mittpunkten
    fx = f(x);

    if(fx > 0)
        a = x;
    else
        b = x;
    end

    x_vec = [x_vec x];
end

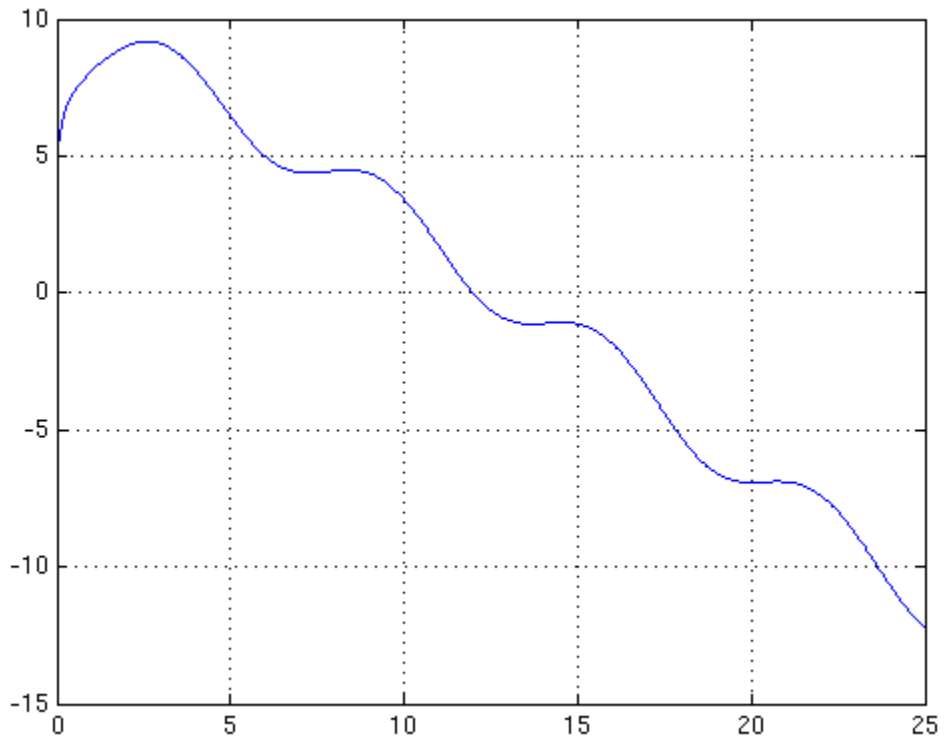
disp(f(x)) % verifiera lösningen

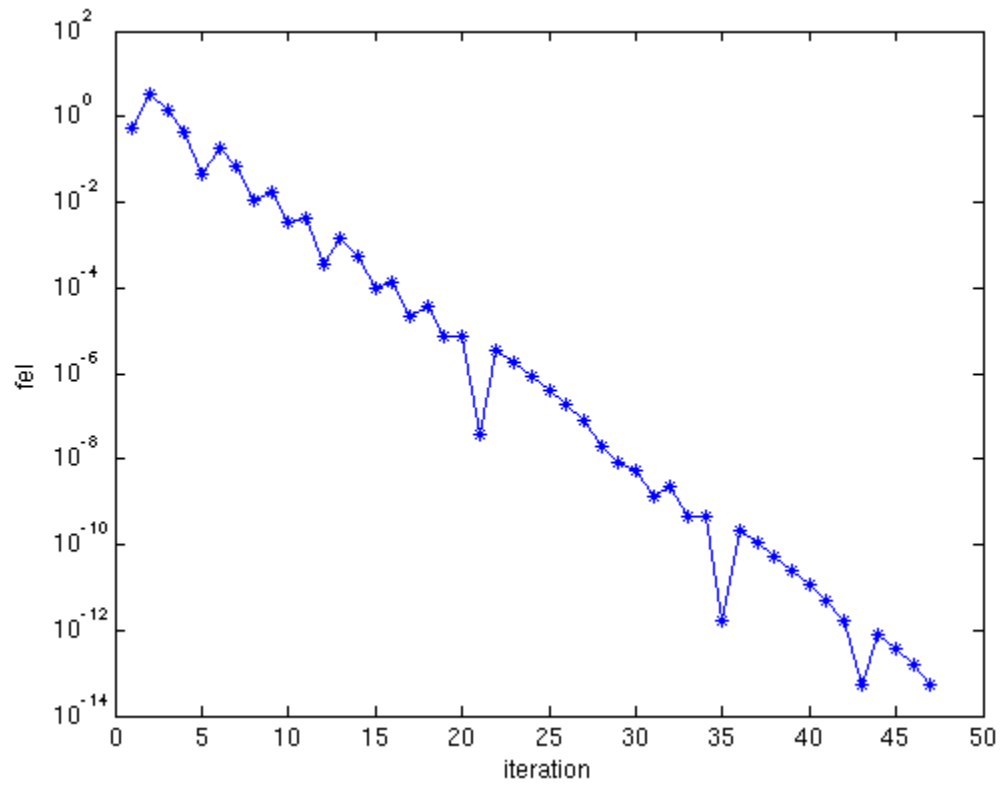
disp('gissningar, x_n      |x-x_n|      f(x_n)')
disp('-----')
disp([x_vec' abs(x_vec'-x) abs(f(x_vec'))]) % visa konvergensen

figure()
semilogy( abs(x_vec'-x), '*-'), xlabel('iteration'), ylabel('fel')
```

```
      -6.189453551736727e-15
gissningar, x_n      |x-x_n|      f(x_n)
-----
12.500000000000000    0.515992605213054    0.624469070379513
 8.750000000000000    3.234007394786946    4.452952669516643
10.625000000000000    1.359007394786946    2.402934307871190
11.562500000000000    0.421507394786946    0.673809880161736
12.031250000000000    0.047242605213054    0.067239677300258
11.796875000000000    0.187132394786946    0.283875185436541
11.914062500000000    0.069944894786946    0.102923154416249
11.972656250000000    0.011351144786946    0.016433124706754
12.001953125000000    0.017945730213054    0.025762401845015
11.987304687500000    0.003297292713054    0.004753572444460
11.979980468750000    0.004026926036946    0.005817650719520
11.983642578125000    0.000364816661946    0.000526494183489
11.985473632812500    0.001466238025554    0.002114927060930
11.984558105468750    0.000550710681804    0.000794563210209
11.984100341796875    0.000092947009929    0.000134121179808
11.983871459960938    0.000135934826009    0.000196164838532
11.983985900878906    0.000021493908040    0.000031016413123
11.984043121337891    0.000035726550944    0.000051553737453
```

11.984014511108398	0.000007116321452	0.000010269000686
11.984000205993652	0.000007188793294	0.000010373621588
11.984007358551025	0.000000036235921	0.000000052289294
11.984010934829712	0.000003540042766	0.000005108360988
11.984009146690369	0.000001751903422	0.000002528037171
11.984008252620697	0.000000857833751	0.000001237874269
11.984007805585861	0.000000410798915	0.000000592792570
11.984007582068443	0.000000187281497	0.000000270251659
11.984007470309734	0.000000075522788	0.000000108981187
11.984007414430380	0.000000019643434	0.000000028345949
11.984007386490703	0.000000008296244	0.000000011971672
11.984007400460541	0.000000005673595	0.000000008187139
11.984007393475622	0.000000001311324	0.000000001892266
11.984007396968082	0.000000002181135	0.000000003147437
11.984007395221852	0.000000000434905	0.000000000627586
11.984007394348737	0.000000000438209	0.000000000632339
11.984007394785294	0.000000000001652	0.000000000002379
11.984007395003573	0.000000000216627	0.000000000312603
11.984007394894434	0.000000000107487	0.000000000155112
11.984007394839864	0.000000000052918	0.000000000076367
11.984007394812579	0.000000000025633	0.000000000036994
11.984007394798937	0.000000000011990	0.000000000017307
11.984007394792116	0.000000000005169	0.000000000007466
11.984007394788705	0.000000000001759	0.000000000002542
11.984007394787000	0.000000000000053	0.000000000000082
11.984007394786147	0.000000000000799	0.000000000001146
11.984007394786573	0.000000000000373	0.000000000000533
11.984007394786786	0.000000000000160	0.000000000000226
11.984007394786893	0.000000000000053	0.000000000000071
11.984007394786946	0	0.000000000000006





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