Examen Final QP1617 - Exercici 1 v1

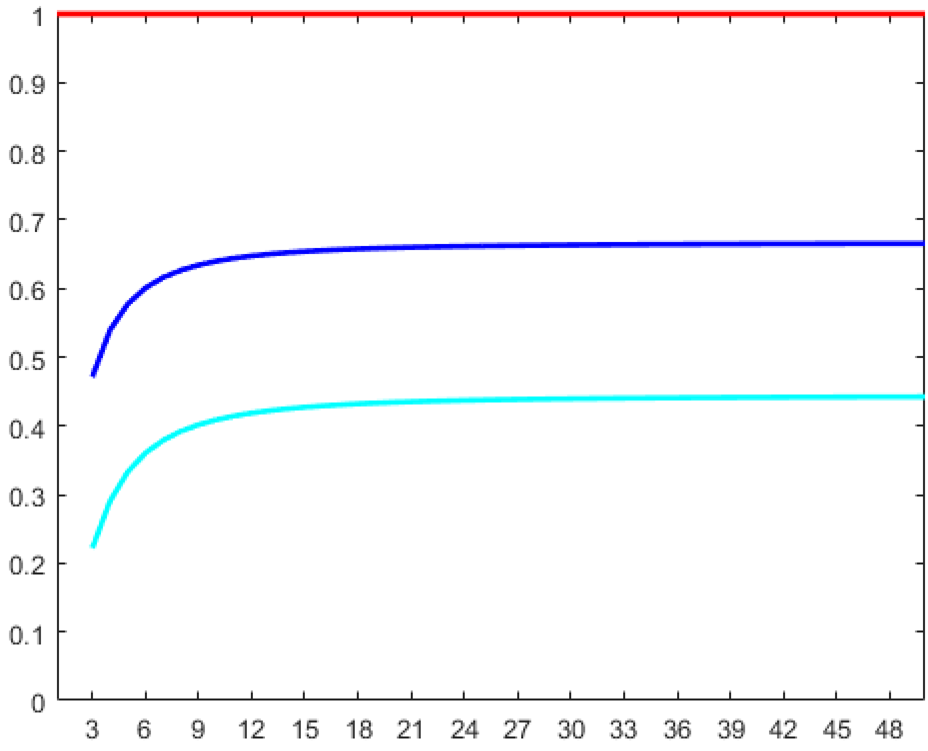
by M. Àngela Grau Gotés

Contents

Gràfic dels radis espectrals de les matrius iteració

```
clear all, clc, format long e, format compact

rJ(1:2)=1;rG(1:2)=1;
for N=3:50
    [A,b] =matriu_v1(N);
    [rJ(N),rG(N)]=radis3(A);
end
plot(3:50,rJ(3:50),'-b',3:50,rG(3:50),'-c',1:50,ones([50,1]),'r','LineWidth',2),
axis([1,Inf,0,1])
set(gca,'XTick',3:3:50)
```



Solució aproximada N=15

```
[A,b] =matriu_v1(15);
D=diag(diag(A));
d=diag(1 ./diag(A));
L=tril(A,-1);
```

```
U=triu(A,1);
```

Mètode de Jacobi

```
Bj=-d*(A-D);
cj=d*b;
% Iteracions del mètode
B=Bj; c=cj;
x=zeros(size(b));
for i=1:200
    x=B*x+c;
    r=norm(A*x-b,'inf');
    if r <=0.00005, break, end
end
RJ=r, IterJ=i
```

```
RJ =
     3.333700428065356e-05
IterJ =
    25
```

Mètode de Gauss-Seidel

```
d=inv(L+D);
Bgs=-d*U;
cgs=d*b;
% Iteracions del mètode
B=Bgs; c=cgs;
z=zeros(size(b));
for i=1:200
    z=B*z+c;
    r=norm(A*z-b,'inf');
    if r <=0.00005, break, end
end
RGS=r, IterGS=i
```

```
RGS =
     2.821869588609527e-05
IterGS =
    15
```

Solucions

```
sols=[ones(size(x)),x,z]
```

```
sols =
     1.000000000000000e+00     9.999939400577999e-01     9.999847209937018e-01
     1.000000000000000e+00     9.999878801155997e-01     9.999774302621938e-01
     1.000000000000000e+00     9.999828310686134e-01     9.999746109967332e-01
     1.000000000000000e+00     9.999777820216271e-01     9.999746214238922e-01
     1.000000000000000e+00     9.999744918086242e-01     9.999765685143542e-01
     1.000000000000000e+00     9.999712015956213e-01     9.999797726750459e-01
     1.000000000000000e+00     9.999700669456457e-01     9.999836026419549e-01
     1.000000000000000e+00     9.999689322956702e-01     9.999874966552825e-01
     1.000000000000000e+00     9.999700669456457e-01     9.999910304006160e-01
     1.000000000000000e+00     9.999712015956213e-01     9.999939555765278e-01
```

```
1.000000000000000e+00     9.999744918086242e-01     9.999961902565787e-01
1.000000000000000e+00     9.999777820216271e-01     9.999977754904952e-01
1.000000000000000e+00     9.999828310686134e-01     9.999988215374328e-01
1.000000000000000e+00     9.999878801155997e-01     9.999994615260113e-01
1.000000000000000e+00     9.999939400577999e-01     9.999998205086704e-01
```

Examen Final QP1617 - Exercici 2 v1

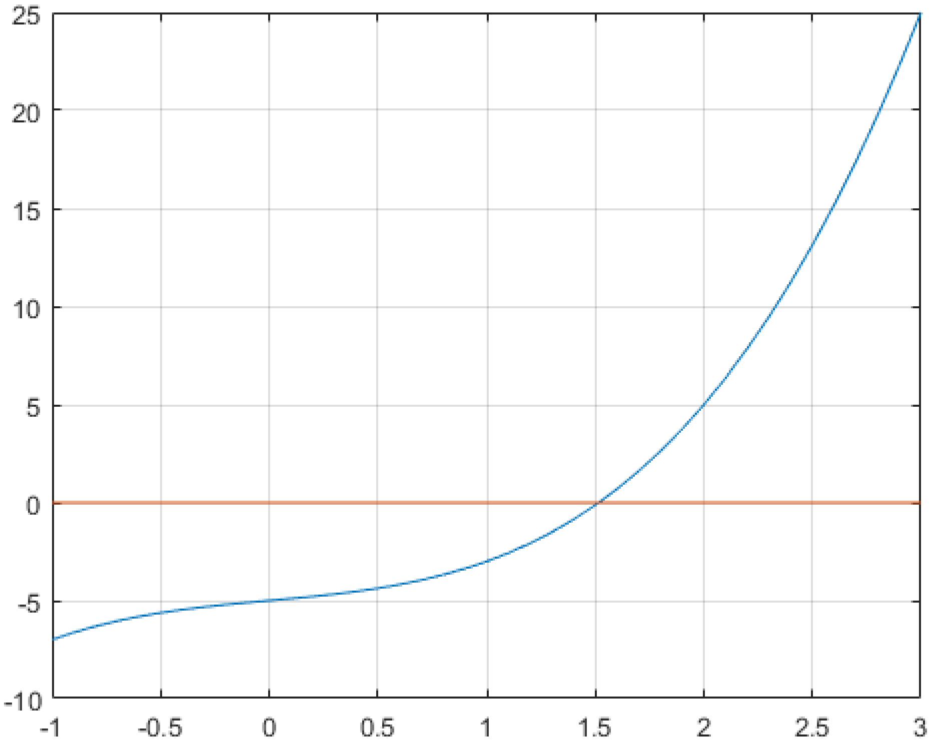
by M. Àngela Grau Gotés

Contents

grafica

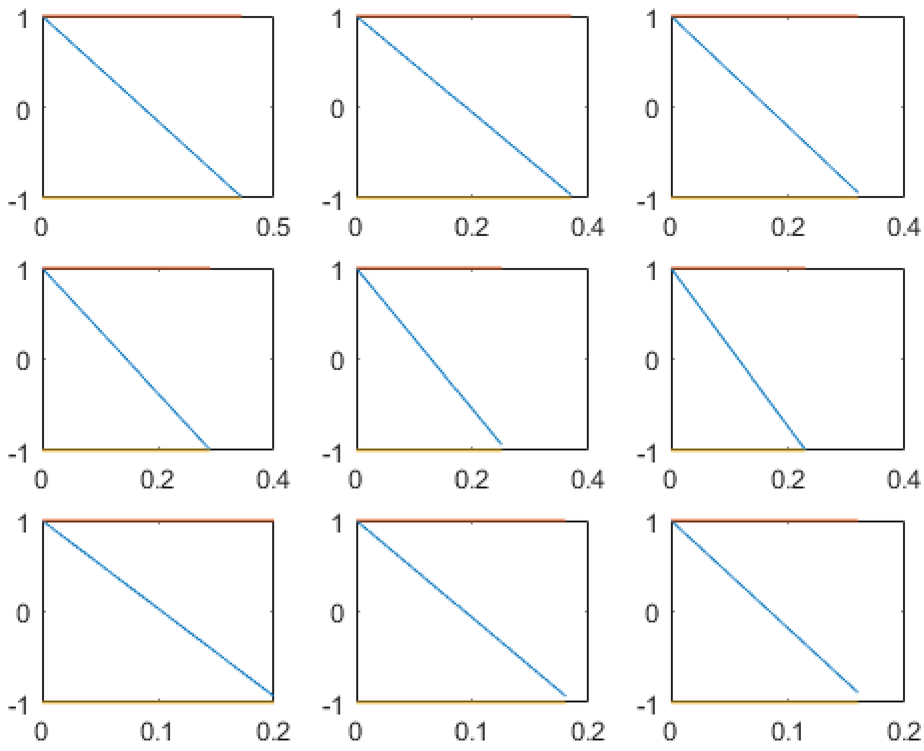
```
clear all,format compact,format long g
x=-1:0.1:3;
f=@(x)x.^3+x-5;
fp=@(x)(3*x.^2+1);
x0 = 2;  p = fzero(f,x0)
figure(1),plot(x,f(x),x,zeros(size(x))),grid
```

```
p =
          1.51598022769282
```



Estudi de convergència

```
for k=1:9
    x=1.0+k*0.1;
    z=0:0.01:2/fp(x);
    gp=@(z)1 -z.*(3*x.^2+1);
figure(2),subplot(3,3,k), plot(z,gp(z),z,ones(size(z)),z,-ones(size(z)))
end
```



Iteracions del mètode

```
l=1/7
g=@(z)z-l*(z.^3+z-5);
format long %g;
x=1; lmax=2/fp(x),tolx=1; tolf=1;
k=0; epsi=0.00000001;
taula(1,:)=[x,tolx,tolf];
while(tolx >epsi | tolf>epsi)
    y=g(x);
    tolx=abs(y-x);
    tolf=abs(f(y));
    x=y;
    k=k+1;
    taula(k,:)=[x,tolx,tolf];
end
disp('          x                tolx                  tolf')
disp(taula)
error=abs(x-p)
```

```
l =
         0.142857142857143
lmax =
   0.500000000000000
          x                tolx                  tolf
   1.428571428571429   0.428571428571429   0.655976676384840
   1.522282382340692   0.093710953769263   0.049933796977356
   1.515148982772498   0.007133399568194   0.006559194391963
   1.516086010542778   0.000937027770280   0.000835162926681
   1.515966701553253   0.000119308989526   0.000106782469107
   1.515981956191696   0.000015254638444   0.000013645800333
   1.515980006791649   0.000001949400048   0.000001743923552
   1.515980255923585   0.000000249131936   0.000000222870259
   1.515980224084976   0.000000031838608   0.000000028482445
```

```
    1.515980228153897   0.000000004068921   0.000000003640008
error =
     4.610765103052472e-10
```

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Examen Final QP1617 - Exercici 3 v1

by M. Àngela Grau Gotés

Contents

mínims quadrats

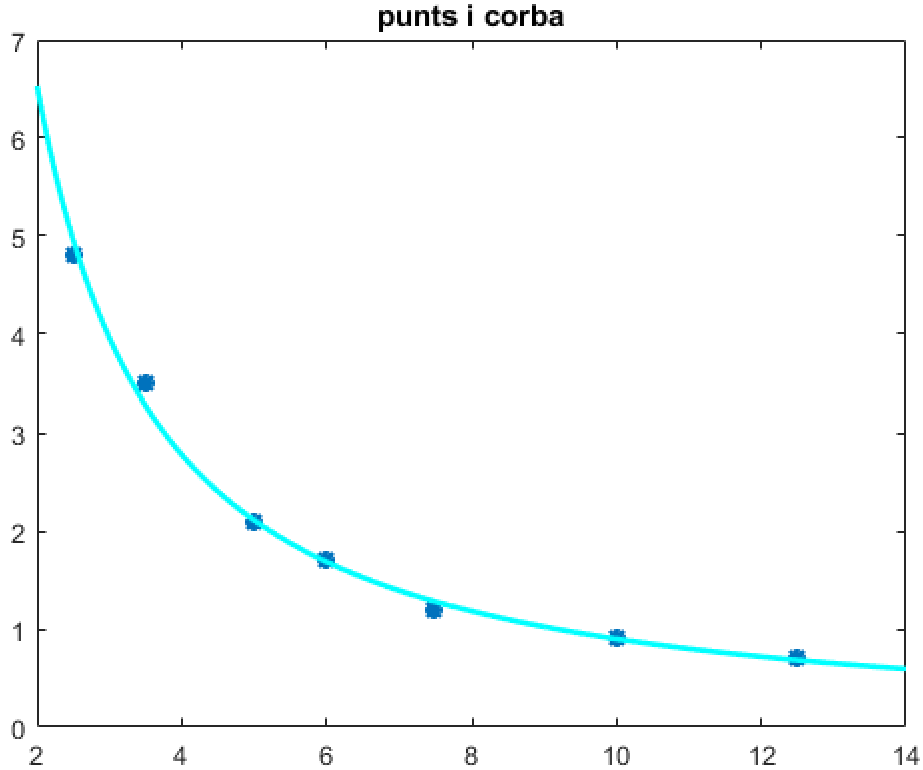
```
clear all, clc
X=[2.5 3.5 5.0 6.0 7.5 10.0 12.5];
Y=[4.8 3.5 2.1 1.7 1.2 0.9 0.7];
TAULA=[X;Y]'
```

```
TAULA =
   2.500000000000000   4.800000000000000
   3.500000000000000   3.500000000000000
   5.000000000000000   2.100000000000000
   6.000000000000000   1.700000000000000
   7.500000000000000   1.200000000000000
  10.000000000000000   0.900000000000000
  12.500000000000000   0.700000000000000
```

ajust per corba potencial

```
cr=polyfit(log(X),log(Y),1)
Z=2:0.1:14;
corba = exp(cr(2)).*Z.^cr(1);
figure(2),plot(X,Y,'*',Z,corba,'cyan','LineWidth',2),title('punts i corba')
e=Y-(exp(cr(2)).*X.^cr(1));
residu_corba=norm(e)
```

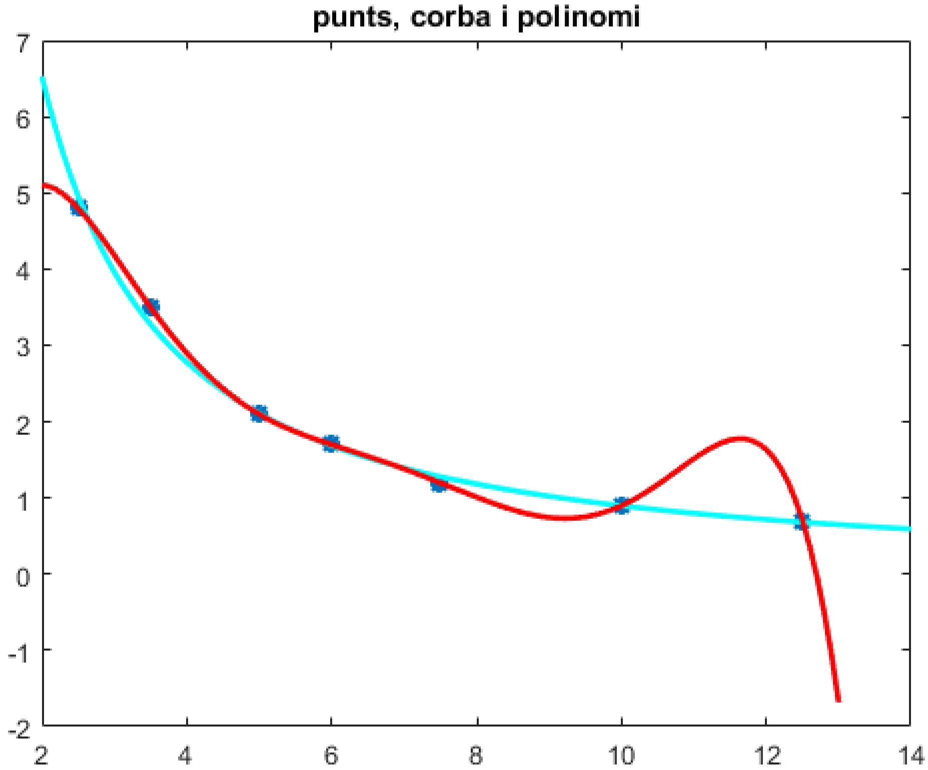
```
cr =
  -1.232913597474220   2.731280552998645
residu_corba =
   0.288049485344730
```



polinomi interpolador

```
disp('polinomi')
coef_pol=polyfit(X,Y,6)
ZZ=2:0.1:13;
pol=polyval(coef_pol,ZZ);
e = Y-polyval(coef_pol,X);residu_pol=norm(e)
figure(3),plot(X,Y,'*',Z,corba,'cyan',ZZ,pol,'r','LineWidth',2),title('punts, corba i polinomi')
```

```
polinomi
coef_pol =
  Columns 1 through 3
  -0.000389027269027   0.016240488400489  -0.267872787952789
  Columns 4 through 6
   2.213814163614031  -9.472166463164944  18.616776556769981
  Column 7
  -8.158974358964180
residu_pol =
     2.238701159520937e-12
```



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