

SUJET A

```
function y=fexoA(t0,y0,tk,yk,k)
h=(tk-t0)/(k+1);
t=t0+h*(1:k);
c=t/(2*h);
M=eye(k)+diag(c(1:end-1),1)-diag(c(2:end),-1);
b=zeros(k,1);
b(1)=c(1)*y0;b(end)=-c(end)*yk;
y=M\b;
```

Script

```
% script exoA
clc,clear all, close all
% initialisation
t0=2;tk=10;y0=1;yk=0;Y=zeros(50,3);K=[10,20,50];
for i=1:length(K)
k=K(i);
y=fexoA(t0,y0,tk,yk,k);
% solution exacte
h=(tk-t0)/(k+1);
t=t0+h*(1:K(i));
yexa=y0*t0./t;
%représentation graphique
subplot(3,1,i)
plot(t,y,t,yexa)
title(['k=',num2str(K(i))])
end
```

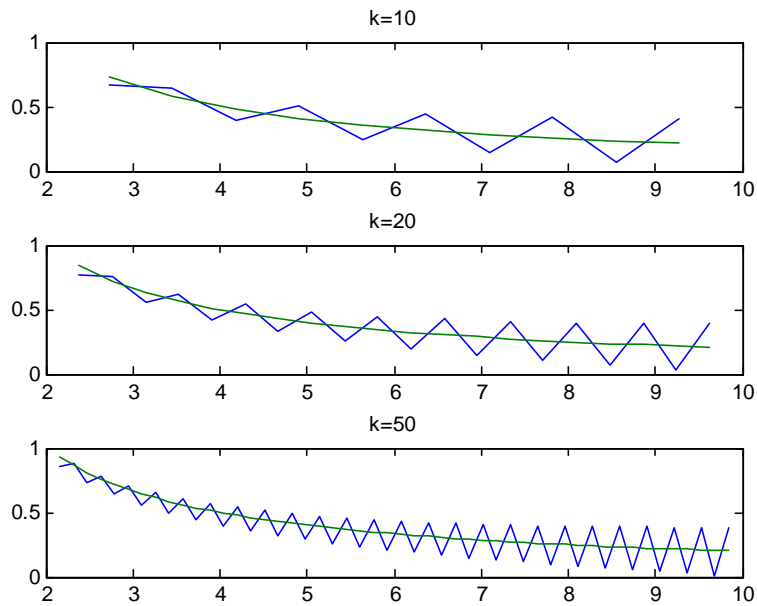
Execution

SUJET B

```
function [c,s]=givens(a,b)
if b==0
c=1;s=0;
elseif abs(b)>abs(a)
tau=-a/b;s=1/sqrt(1+tau^2);c=s*tau;
else tau=-b/a;s=1/sqrt(1+tau^2);c=s*tau;
end
```

Script

```
%script exoB
clc, clear all,
m=7;n=5;
A=rand(7,5);a=A(2,2);b=A(6,2);
[c,s]=givens(a,b);
g=eye(7,5);
g(2,2)=c;g(6,6)=c;g(6,2)=-s;g(2,6)=s;
B=g'*A;
disp('La matrice initiale')
disp(A)
```



disp('après rotation')

disp(B)

Exécution

La matrice initiale

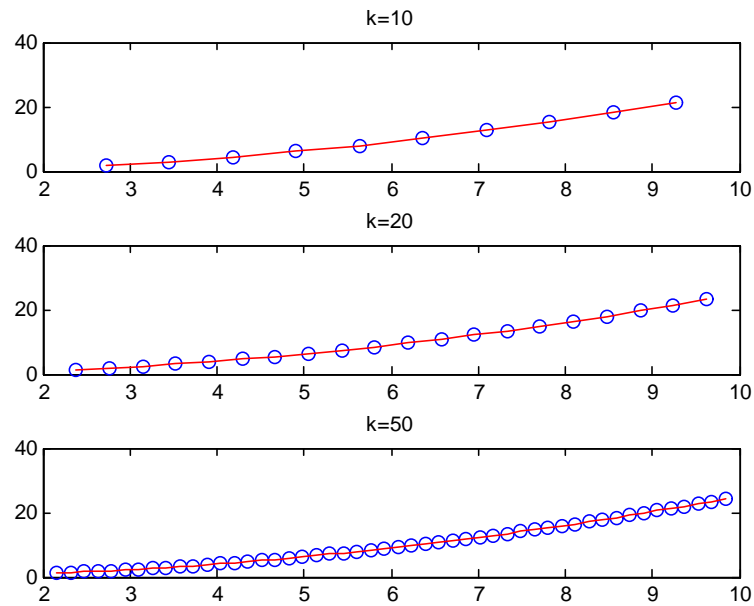
```
0.9827 0.8178 0.1788 0.6385 0.8200
0.7302 0.2607 0.4229 0.0336 0.7184
0.3439 0.5944 0.0942 0.0688 0.9686
0.5841 0.0225 0.5985 0.3196 0.5313
0.1078 0.4253 0.4709 0.5309 0.3251
0.9063 0.3127 0.6959 0.6544 0.1056
0.8797 0.1615 0.6999 0.4076 0.6110
```

après rotation

```
0.9827 0.8178 0.1788 0.6385 0.8200
-1.1637 -0.4072 -0.8053 -0.5242 -0.5411
0.3439 0.5944 0.0942 0.0688 0.9686
0.5841 0.0225 0.5985 0.3196 0.5313
0.1078 0.4253 0.4709 0.5309 0.3251
-0.0195 -0.0000 -0.1209 -0.3933 0.4841
```

SUJET C

```
function y=fexoC(t0,y0,tk,yk,k)
h=(tk-t0)/(k+1);
t=t0+h*(1:k);
c=t/(4*h);
M=eye(k)-diag(c(1:end-1),1)+diag(c(2:end),-1);
b=zeros(k,1);
b(1)=-c(1)*y0;b(end)=c(end)*yk;
```



```
y=M\b;
```

Script

```
% script exoC
clc,clear all, close all
% initialisation
t0=2;tk=10;y0=1;yk=25;K=[10,20,50];
for i=1:length(K)
k=K(i);
y=fexoC(t0,y0,tk,yk,k);
% solution exacte
h=(tk-t0)/(k+1);
t=t0+h*(1:K(i));
yexa=y0/t0^2*t.^2;
%représentation graphique
subplot(3,1,i)
plot(t,y,'o',t,yexa,'r')
title(['k=',num2str(K(i))])
end
```

Exécution

voir figure ci-dessus