

TP2 matlab analyse numérique

1)

```
function y = cauchy(a)

N=100;

dx = 1/N;
x=[0:dx:1]
y(1) = 1;
y(2) = 1+a*dx;

for i=2:N

y(i+1) = -dx*dx * exp(x(i))+2* y(i)- y(i-1);

end

plot(x,y, 'b');
```

2)

```
function U = derichlet()

N=100;

dx = 1/(N-1);
x=[0:dx:1];
A = sparse(N,N);
U= sparse(N,1);
F= sparse(N,1);

A(1,1) = 1;
A(N,N) = 1 ;

F(1)=1;
F(N)=1;

for i=2:N-1
    F(i)=dx*dx*exp(x(i));% voir quel est le coefficient à appliquer... (dx
ou dx²???)

    for j=1:N
        if (i==j-1) || (i==j+1)
            A(i,j)=-1;
        else if (i==j)
            A(i,j)=2;

        else
            A(i,j)= 0;
        end
    end
end
```

```

end
size(x)
size(U)
U=A\F;

plot(x,U, 'red');

exo3:

function y = shooting()
%alpha(0) = a(1) car matlab commence pas à 0
a(1)=0;
a(2)=-1;
N=100;

dx = 1/N;
x=[0:dx:1];
y(1) = 1;
y(2) = 1+a(1)*dx;

for i=2:N
    y(i+1) = 1+a(i)*dx;
    if (y(i+1)<0) || (i==2)
        a(i+1)=(a(i-1)+a(i))/2;
    else if (y(i+1)>0)
        a(i+1)=(a(i-2)+a(i))/2;
    end
end
end
%y(i+1) = -dx*dx * exp(x(i))+2* y(i)- y(i-1);

end

plot(x,y, 'b');

```

avec comparaison de la valeur exacte

```

function y = cauchy(a)

N=100;

dx = 1/N;
x=[0:dx:1]
y(1) = 1;
y(2) = 1+a*dx;

for i=2:N

y(i+1) = -dx*dx * exp(x(i))+2* y(i)- y(i-1);

end
for j = 2 : N+1

```

```

    u(j)=2+(a+1)*x(j)-exp(x(j));
end
size(u)
size(y)
%y(N) = -dx*dx * exp(x(N))+2* y(N)- y(N-1);

plot(x,y,'bo-',x,u,'rx-');


---


function U = derichlet()
    clear all;
    close all;
    N=100;

    dx = 1/(N-1);
    x=[0:dx:1];
    A = sparse(N,N);
    U= sparse(N,1);
    F= sparse(N,1);

    uex = sparse(N,1);
    fex = sparse(N,1);

    A(1,1) = 1;
    A(N,N) = 1;

    F(1)=1;
    F(N)=0;

    for i=2:N-1
        F(i)=dx*dx*exp(x(i));% voir quel est le coefficient à appliquer... (dx
ou dx^2???)

        A(i,i-1) =-1;
        A(i,i) = 2;
        A(i,i+1) = -1;
    end
    for i = 1: N
        fex(i) = 2+(exp(i)-2)*x(i)-exp(x(i));
    end

    uex = fex;
    U=A\F;
    size(U)
    size(uex)
    plot(x,U,'ro-',x,uex,'bx-');



---


function y = shooting()
%alpha(0) = a(1) car matlab commence pas à 0
a(1)=0;
a(2)=-1;
N=100;
%ne pas garder N=100 useless
dx = 1/N;
x=[0:dx:1];
y(1) = 1;
y(2) = 1+a(1)*dx;

for i=2:N

```

```
%(sizey)
y(i+1)= cauchy(a(i))
%1+a(i)*dx;
if (y(i+1)<0) || (i==2)
    a(i+1)=(a(i-1)+a(i))/2;
else if (y(i+1)>0)
    a(i+1)=(a(i-2)+a(i))/2;
end
end
%y(i+1) = -dx*dx * exp(x(i))+2* y(i)- y(i-1);

end

plot(x,y, 'b');
```