Correction 1 : Initiation à Scilab

Ex 1 *Manipulation sur les vecteurs*

1)

```
v1 = 1:.1:3
```

2)

```
v2 = 3:-.1:1
```

3)

```
v3 = (1:10)^2
```

4)

```
n = (1:10);
un = ones(1,10);
v4 = (- un).^n .* (n^2)
```

5)

```
un = ones(1,10)
v5 = [0*un, un]
```

Ex 2 *Manipulation sur les Matrices*

1)

```
m = matrix(1:36,6,6)'
m = [1:6;7:12;13:18;19:24;25:30;31:36]
```

2)

```
n = 5
C = zeros(n,n);
for i = 1:n
   C(i,i) =2;
end;
for i = 1:n-1
   C(i,i+1) = -1;
end;
for i = 2:n
   C(i,i-1) = -1;
end;
```

ou dans un style plus `Scilab`,

```
C = 2*eye(n,n)-diag(ones(n-1,1),1)-diag(ones(n-1,1),-1)}
```

Ex 3 *Exemple de tracé*

```
X = 0:.1:4*%pi;
Y = sin(X) + X;
plot2d(X,Y)
xtitle('Exemple','x','sin(x) + x');
```

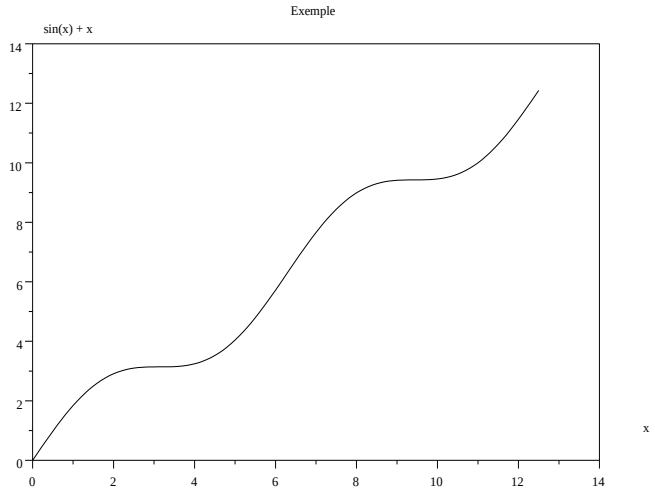

FIG. 1 – Tracé de $f(x) = \sin x + x$.

Ex 4 *Ecriture d'une fonction*

```
function C = alterne2_colonne(A,B)

[n,m] = size(A)

C = []

for i=1:m
  C = [C, A(:,i), B(:,i)];
end;
```

ou avec un style plus **scilab**

```
function C = alterne2_colonne(A,B)

[n,m] = size(A)

A = matrix(A,n*m,1);
B = matrix(B,n*m,1);

C = [A B]

C = matrix(C,n,2*m);
```

```
endfunction
```

Ex 5 *Calcul de la solution d'une edo*

1)

C'est une équation à coefficients constants : une solution particulière de l'équation est $u_s = 1$; la solution générale de l'équation sans second membre $u_0 = a\ e^x + b\ e^{-x}$, alors la solution peut s'écrire $u = u_s + u_0$.

Les conditions aux limites permettent de calculer les coefficients a et b ....

2)

```
clear
n = 50;
F = ones(n,1);
A = eye(n,n);

x = matrix(linspace(0,1,n),n,1);
Dx = 1/(n-1);
u_exact = 1- (exp(x) + exp(1-x))/(1+exp(1));

//  on impose les conditions aux limites

 F(1) = 0;
 F(n) = 0;

for i=2:n-1
   A(i,i) = A(i,i) + 2./Dx^2;
   A(i,i-1) = -1/Dx^2;
   A(i,i+1) = -1/Dx^2;
end;


u_c = A\F;
erreur = norm(u_exact-u_c)

\\ Trace de la solution

xbasc()
plot2d(x,u_c,style=[-1])

x=linspace(0,1,100);
u_exact = 1- (exp(x) + exp(1-x))/(1+exp(1));
plot2d(x,u_exact,style=[1])

xtitle('Solution','x','u(x)');
```

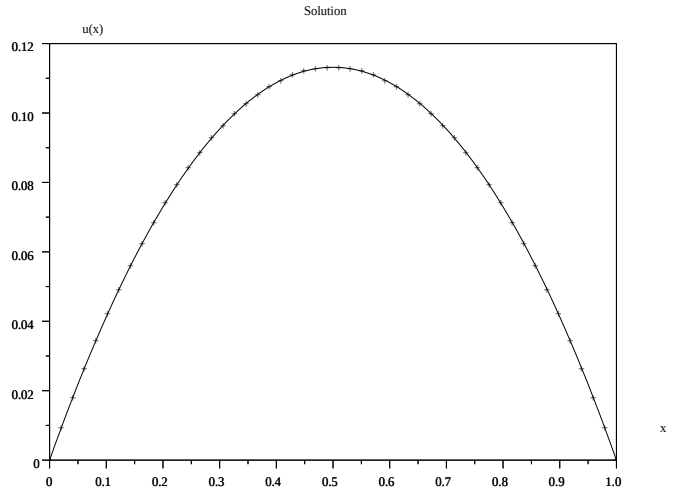

FIG. 2 – Solution du problème pour $n = 50$: solution exacte (–), solution calculée (+).

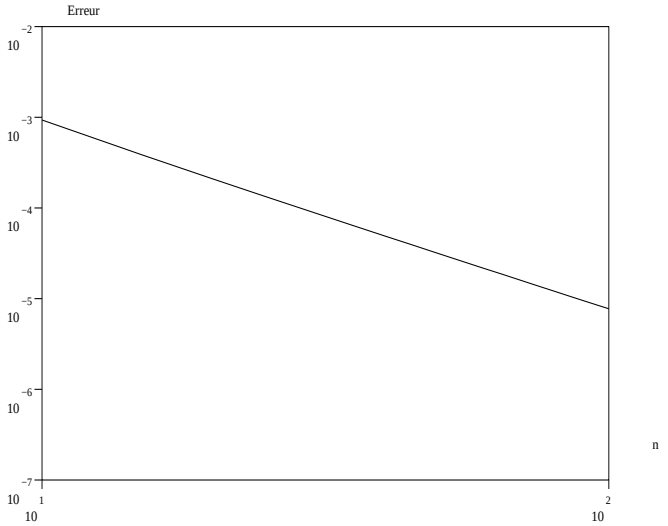

FIG. 3 – Evolution de l'erreur $||u - u_{exact}||/||u_{exact}||$ en fonction de n