**princ.f90**

! program directsolver

! programa principal para resolver eq lineares - metodo direto

 implicit real \*8 (a-h,o-z)

 parameter (np=10)

 dimension a(np,np),al(np,np),au(np,np),p(np,np)

 dimension x(np),b(np),z(np)

 open(unit=1,file='input.txt',status='old')

 open(unit=2,file='output.txt',status='unknown')

! Leitura de dados

 read(1,\*)n,dl

 write(\*,\*)'n= ',n,' dl= ',dl

 pi=4\*atan(1.d0)

 write(\*,\*)'pi= ',pi

 write(\*,\*)'a matriz a(i,j) eh:'

 do i=1,n

 read(1,\*) (a(i,j),j=1,n)

 write(\*,\*)(a(i,j),j=1,n)

 enddo

 write(\*,\*)'o vetor b(i) eh:'

 write(2,\*)'o vetor b(i) eh:'

 read (1,\*) (b(i),i=1,n)

 write(\*,\*)'b(i)=', (b(i),i=1,n)

 write(2,\*)'b(i)=', (b(i),i=1,n)

! fatoracao LU

 do k=1,n

 al(k,k)=dl

 if (k.gt.1) then

 sum=0.d0

 do is=1,k-1

 sum=sum+al(k,is)\*au(is,k)

 enddo

 else

 sum=0.d0

 endif

 au(k,k)=(a(k,k)-sum)/al(k,k)

 do j=k+1,n

 if (k.gt.1) then

 sum=0.d0

 do is=1,k-1

 sum=sum+al(k,is)\*au(is,j)

 enddo

 else

 sum=0.d0

 endif

 au(k,j)=(a(k,j)-sum)/al(k,k)

 enddo

 do i=k+1,n

 if (k.gt.1) then

 sum=0.d0

 do is=1,k-1

 sum=sum+al(i,is)\*au(is,k)

 enddo

 else

 sum=0.d0

 endif

 al(i,k)=(a(i,k)-sum)/au(k,k)

 enddo

 enddo

! imprima a matriz l(i,j)

 write(\*,\*)'a matriz l(i,j) eh'

 write(2,\*)'a matriz l(i,j) eh'

 do i=1,n

 write(\*,\*)'linha ',i

 write(2,\*)'linha ',i

 write(2,\*)(al(i,j),j=1,n)

 write(\*,\*)(al(i,j),j=1,n)

 enddo

! imprima a matriz u(i,j)

 write(\*,\*)'a matriz u(i,j) eh'

 write(2,\*)'a matriz u(i,j) eh'

 do i=1,n

 write(\*,\*)'linha ',i

 write(2,\*)'linha ',i

 write(2,\*)(au(i,j),j=1,n)

 write(\*,\*)(au(i,j),j=1,n)

 enddo

! verificacao

! multiplicar l por u e obter a(i,j)

 write(\*,\*)'o produto de l por u eh a matriz p(i,j) abaixo'

 write(2,\*)'o produto de l por u eh a matriz p(i,j) abaixo'

 do i=1,n

 do j=1,n

 p(i,j)=0.d0

 do is=1,n

 p(i,j)=p(i,j)+al(i,is)\*au(is,j)

 enddo

 enddo

 write(2,\*)'linha ',i

 write(\*,\*)'linha ',i

 write(2,\*)(p(i,j),j=1,n)

 write(\*,\*)(p(i,j),j=1,n)

 enddo

! forward substitution

 do i=1,n

 if(i.gt.1) then

 sum=0.d0

 do is=1,i-1

 sum=sum+al(i,is)\*z(is)

 enddo

 else

 sum=0.d0

 endif

 z(i)=(b(i)-sum)/al(i,i)

 enddo

! backward substitution

 do i=n,1,-1

 if(i.lt.n) then

 sum=0.d0

 do is=i+1,n

 sum=sum+au(i,is)\*x(is)

 enddo

 else

 sum=0.d0

 endif

 x(i)=(z(i)-sum)/au(i,i)

 enddo

! solucao

 write(\*,\*)'a solucao eh'

 write(2,\*)'a solucao eh'

 do i=1,n

 write(\*,\*)'x(',i,')=',x(i)

 write(2,\*)'x(',i,')=',x(i)

 enddo

 stop

 end

!----------------------------------

**input.txt**

4 1.d0 ! n, dl

-1.d0 1.d0 0.d0 -3.d0 ! a(1,j)

0.d0 1.d0 -1.d0 -1.d0 ! a(2,j)

1.d0 0.d0 3.d0 1.d0 ! a(3,j)

3.d0 0.d0 1.d0 2.d0 ! a(4,j)

4.d0 3.d0 0.d0 1.d0 ! b(i)