**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)