

C***** 3 DIMENSIONAL wave and current in open sea *****

C*** ****

C** ****

C*** PROGRAMMED BY C.R. CHOU 10,20,1993 ****

PARAMETER(NDZ=3,N1=128,N12=N1/NDZ,i2=272,N3= 80,N4=272)

PARAMETER(NT=N1+N2+N3+N4,NT12=N1+N2)

PARAMETER(N=N1+N2,NS=N3+N4)

PARAMETER(NX=N) ! 取 MAX(N,NS)

PARAMETER(L=10,L1=11) ! G3_2X2 暫用檔號

PARAMETER(OI_NO=3)

REAL X(NT,4),Y(NT,4),Z(NT,4),XX(NT),YY(NT),ZZ(NT)

REAL XN(NT),YN(NT),ZN(NT),S(NT),AF(NT)

REAL XM(N12),YM(N12),SM(N12),XNM(N12),YNM(N12)

REAL KH,KR1(N3),GB(NX,NX),G(NX,NX),CC(NX,8)

REAL KD(OI_NO,N2),U(N2),V(N2),SK(N2),AFA2(N4)

COMPLEX H(N12,N12),HB(N12,N12),FO(N12),FOB(N12)

COMPLEX RS,IM

c*****

OPEN(UNIT=21,FILE='w3.in',FORM='FORMATTED',STATUS='OLD')

OPEN(UNIT=22,FILE='w3.out',FORM='FORMATTED',STATUS='unknown')

OPEN(UNIT=23,FILE='current.w3',FORM='FORMATTED',STATUS='OLD')

OPEN(UNIT=25,FILE='w3goe.in',FORM='FORMATTED',STATUS='OLD')

OPEN(UNIT=28,FILE='coo.w3',FORM='FORMATTED',STATUS='UNKNOWN')

OPEN(UNIT=1,FILE='1.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=2,FILE='2.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=3,FILE='3.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=4,FILE='4.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=8,FILE='8.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=9,FILE='9.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=14,FILE='14.apr',FORM='UNFORMATTED',STATUS='UNKNOWN')

OPEN(UNIT=15,FILE='15.apr',FORM='UNFORMATTED',STATUS='UNKNOWN')

OPEN(UNIT=30,FILE='30.apr',FORM='UNFORMATTED',status='UNKNOWN')

OPEN(UNIT=31,FILE='31.apr',FORM='UNFORMATTED',status='UNKNOWN')

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OPEN(UNIT=32,FILE='32.apr',FORM='UNFORMATTED',status='UNKNOWN')
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```
OPEN(UNIT=10,FILE='10.APT',FORM='UNFORMATTED',status='UNKNOWN')
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```
OPEN(UNIT=11,FILE='11.apr',FORM='UNFORMATTED',status='UNKNOWN')
```

```
IM=(0.,1.)
pai=3.1415927

DO J=1,NT
READ(25,1006) (X(J,K),Y(J,K),Z(J,K),K=1,4)
END DO
1006 FORMAT(3F10.4)

DO I=1,n3
KR(I)=1.0
AFA1(I)=IM*KH*SQRT(1-KR(I)**2)
END DO
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DO I=1,N4
AFA2(I)=0
AFA2(I)=IM*AFA2(I)
END DO

CALL NORMAL_3D(X,Y,Z,XX,YY,ZZ,XN,YN,ZN,S,NT,NT,AF)
CALL NORMAL_2D(X,Y,XM,YM,XNM,YNM,SM,NT,N12,NDZ)

c***** begin change normal vector case by case if necessary *****
do 5451 i=1,n3
ii=i+n1+n2
xn(ii)=-xn(ii)
yn(ii)=-yn(ii)
5451 zn(ii)=-zn(ii)
do i=1,n4
ii=n1+n2+n3+i
zn(ii)=-zn(ii)
end do

c ***** end of change *****
```



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CALL G3_2x2(GB,G,NX,NT,N,NS,XX,YY,ZZ,XN,YN,ZN,S,L,L1)

do nshg=1,1

SHG=0.5

! READ(25,1007) SHG

CALL SHG_KH(SHG,KH)

N0=(1+2*KH/SINH(2.*KH))/2.

C=KH/(N0*SINH(KH))

CALL G2_HANKEL(GB,G,NX,H,HB,N12,XM,YM,SM,XNM,YNM,KH)

CALL RQ(GB,G,NX,N1,N12,Z,ZZ,NT,KH)

DO 100 I=1,N1

DO 100 J=1,N12

RS=(0.,0.)

DO 101 K=1,N12 2011 埃及尼羅河之旅

101 RS=RS+GB(I,K)*H(K,J)

100 HB(I,J)=RS

DO 102 I=1,N1

DO 102 J=1,N1

RS=0

DO 103 K=1,N12

103 RS=RS+HB(I,K)*G(K,J)

102 H(I,J)=RS*C ! C[R][K][Q]

C *****

DO IOI=1,OI_NO

OSTEP=45

OO=OSTEP*(IOI-1)

OI=OO/180.*PAI

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C *****

CALL INCIDENT(F0,F0B,X,Y,XN,YN,N12,OI,KH)

DO I=1,NX

DO J=1,4

CC(I,J)=0

```

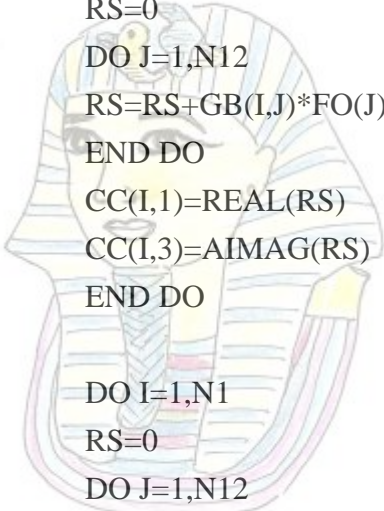
END DO
END DO

```

```

DO I=1,N1
RS=0
DO J=1,N12
RS=RS+GB(I,J)*FO(J)
END DO
CC(I,1)=REAL(RS)
CC(I,3)=AIMAG(RS)
END DO

```



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DO I=1,N1
RS=0
DO J=1,N12
RS=RS+HB(I,J)*FOB(J)
END DO

```

```

CC(I,1)=CC(I,1)-REAL(RS)
CC(I,3)=CC(I,3)-AIMAG(RS)
END DO

```

```

REWIND 31
WRITE(31) (CC(I,1),I=1,N)
WRITE(31) (CC(I,2),I=1,NS)
WRITE(31) (CC(I,3),I=1,N)
WRITE(31) (CC(I,4),I=1,NS)

```

C *****

```

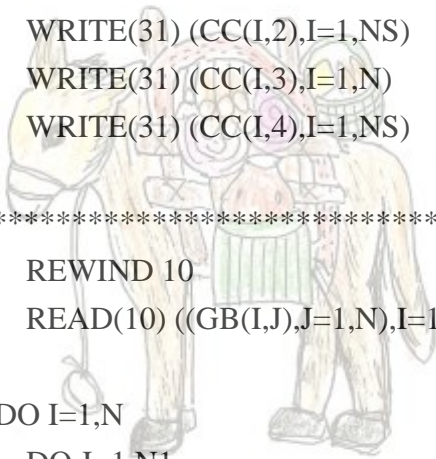
REWIND 10
READ(10) ((GB(I,J),J=1,N),I=1,N)

```

```

DO I=1,N
DO J=1,N1
GB(I,J)=GB(I,J)-REAL(H(I,J))
END DO
DO J=1,N2
JJ=J+N1
GB(I,JJ)=SHG*GB(I,JJ)
IF(I.EQ.JJ) GB(I,JJ)=GB(I,JJ)-1

```



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```

END DO
END DO

```

```

REWIND 1
REWIND 2

```

```

WRITE(1) ((GB(I,J),J=1,N),I=1,N)

```

```

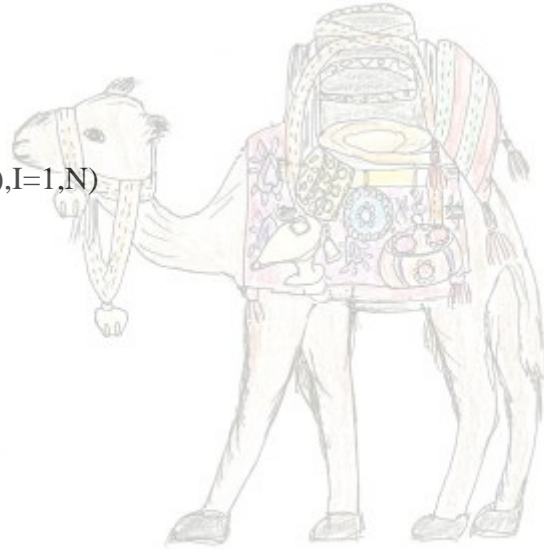
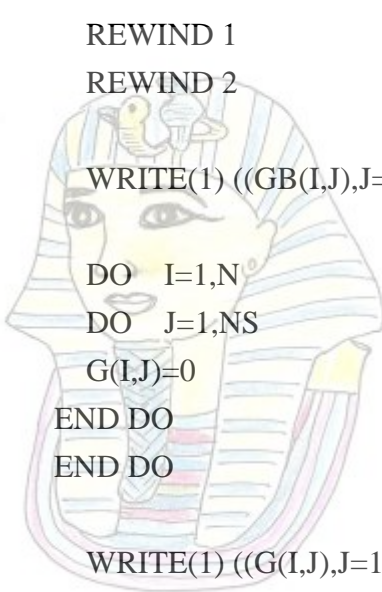
DO I=1,N
DO J=1,NS
G(I,J)=0
END DO
END DO

```

```

WRITE(1) ((G(I,J),J=1,NS),I=1,N)

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```

READ(10) ((GB(I,J),J=1,NS),I=1,N)

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```

READ(10) ((GB(I,J),J=1,N),I=1,NS)

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```

DO I=1,NS
DO J=1,N1
G(I,J)=GB(I,J)

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```

END DO

```

```

DO J=1,N2

```

```

JJ=J+N1

```

```

G(I,JJ)=GB(I,JJ)*SHG

```

```

END DO

```

```

END DO

```

```

WRITE(1) ((G(I,J),J=1,N),I=1,NS)

```

```

DO I=1,NS

```

```

DO J=1,NS

```

```

G(I,J)=0

```

```

IF(I.EQ.J) G(I,J)=-1

```

```

END DO

```

```

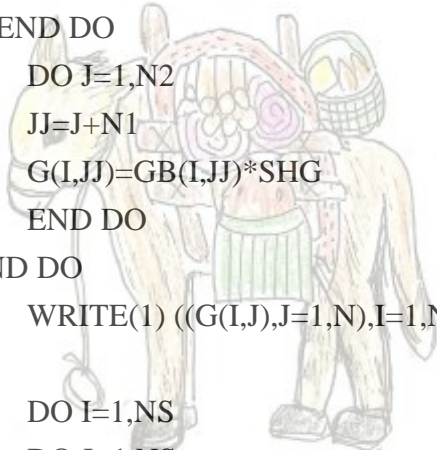
END DO

```

```

WRITE(1) ((G(I,J),J=1,NS),I=1,NS)

```



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```
DO I=1,N
```

```
DO J=1,N
```

```
G(I,J)=0
```

```
END DO
```

```
END DO
```

```
DO I=1,N1
```

```
DO J=1,N1
```

```
G(I,J)=-AIMAG(H(I,J))
```

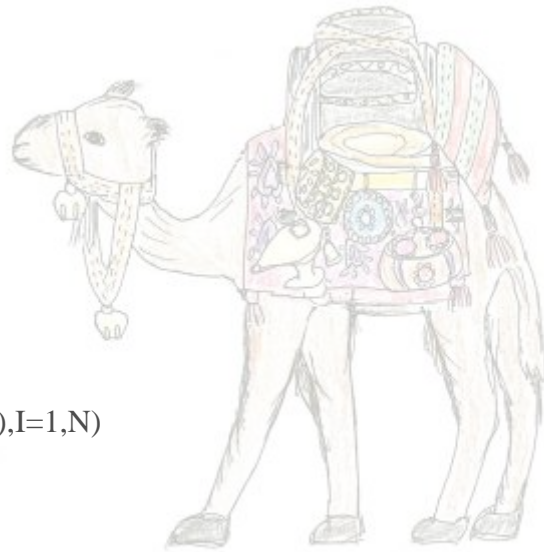
```
END DO
```

```
END DO
```

```
WRITE(2) ((G(I,J),J=1,N),I=1,N)
```

```
BACKSPACE 10
```

```
BACKSPACE 10
```



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```
READ(10) ((GB(I,J),J=1,NS),I=1,N)
```

```
DO I=1,N
```

```
DO J=1,N3
```

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```
G(I,J)=KH*SQRT(1.-KR1(J)**2)*GB(I,J)
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```
END DO
```

```
DO J=1,N4
```

```
JJ=J+N3
```

```
G(I,JJ)=KH*AFA2(J)*GB(I,JJ)
```

```
END DO
```

```
END DO
```

```
WRITE(2) ((G(I,J),J=1,NS),I=1,N)
```

```
DO I=1,NS
```

```
DO J=1,N
```

```
G(I,J)=0
```

```
END DO
```

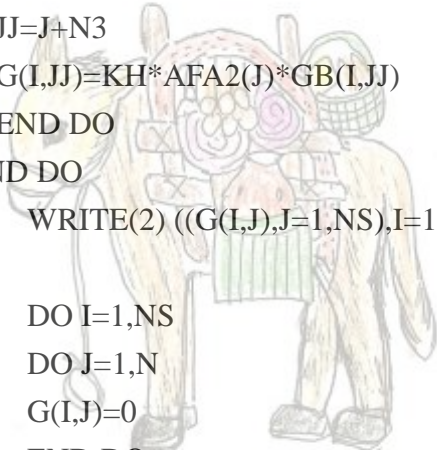
```
END DO
```

```
WRITE(2) ((G(I,J),J=1,N),I=1,NS)
```

```
READ(10) ((GB(I,J),J=1,N),I=1,NS)
```

```
READ(10) ((GB(I,J),J=1,NS),I=1,NS)
```

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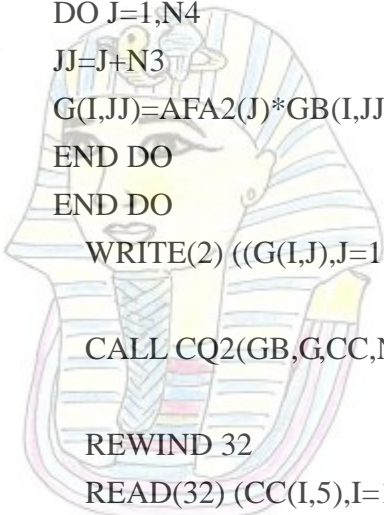
```

DO I=1,NS
  DO J=1,N3
    G(I,J)=KH*SQRT(1.-KR(J)**2)*GB(I,J)
  END DO
DO J=1,N4
  JJ=J+N3
  G(I,JJ)=AFA2(J)*GB(I,JJ)
END DO
END DO
WRITE(2) ((G(I,J),J=1,NS),I=1,NS)

CALL CQ2(GB,G,CC,NX,N,NS)

REWIND 32
READ(32) (CC(I,5),I=1,N)
READ(32) (CC(I,6),I=1,NS)
READ(32) (CC(I,7),I=1,N)
READ(32) (CC(I,8),I=1,NS)

```



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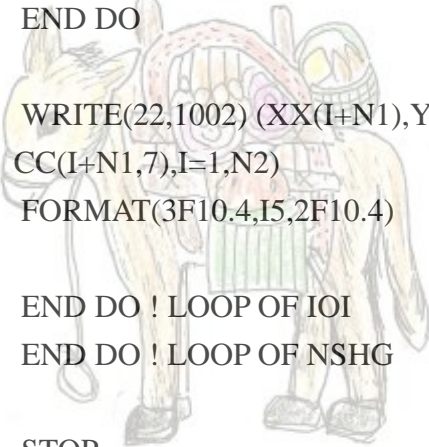
DO I=1,N2
  II=I+N1
  KD(IOI,I)=CABS(CMPLX(CC(II,5),CC(II,7)))
END DO

WRITE(22,1002) (XX(I+N1),YY(I+N1),KD(IOI,I),I,CC(I+N1,5),
/ CC(I+N1,7),I=1,N2)
1002  FORMAT(3F10.4,I5,2F10.4)

END DO ! LOOP OF IOI
END DO ! LOOP OF NSHG

STOP
END

```



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c subroutine

C=====

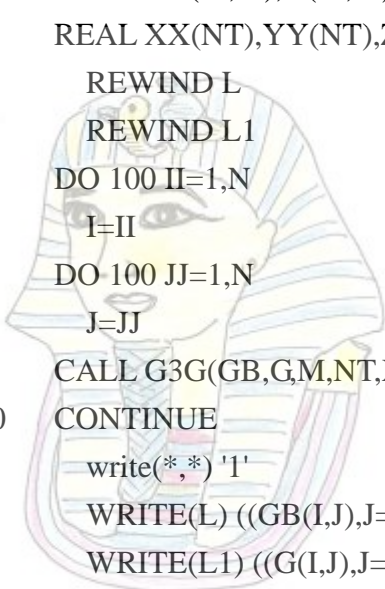
SUBROUTINE G3_4(GB,G,M,NT,N,NS,XX,YY,ZZ,XN,YN,ZN,S,L,L1)

C=====

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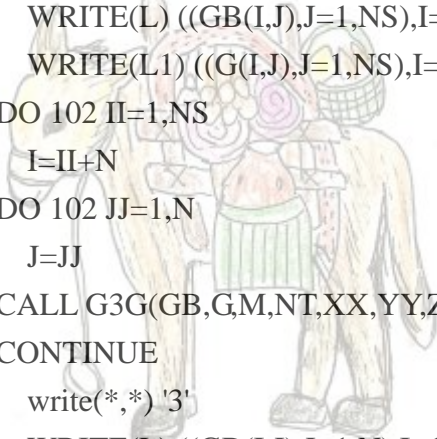
REAL GB(M,M),G(M,M)
REAL XX(NT),YY(NT),ZZ(NT),XN(NT),YN(NT),ZN(NT),S(NT)
  REWIND L
  REWIND L1
DO 100 II=1,N
  I=II
DO 100 JJ=1,N
  J=JJ
CALL G3G(GB,G,M,NT,XX,YY,ZZ,XN,YN,ZN,S,I,II,J,JJ)
100 CONTINUE
  write(*,*) '1'
  WRITE(L) ((GB(I,J),J=1,N),I=1,N)
  WRITE(L1) ((G(I,J),J=1,N),I=1,N)
DO 101 II=1,N
  I=II
DO 101 JJ=1,NS
  J=JJ+N
CALL G3G(GB,G,M,NT,XX,YY,ZZ,XN,YN,ZN,S,I,II,J,JJ)
101 CONTINUE
  write(*,*) '2'
  WRITE(L) ((GB(I,J),J=1,NS),I=1,N)
  WRITE(L1) ((G(I,J),J=1,NS),I=1,N)
DO 102 II=1,NS
  I=II+N
DO 102 JJ=1,N
  J=JJ
CALL G3G(GB,G,M,NT,XX,YY,ZZ,XN,YN,ZN,S,I,II,J,JJ)
102 CONTINUE
  write(*,*) '3'
  WRITE(L) ((GB(I,J),J=1,N),I=1,NS)
  WRITE(L1) ((G(I,J),J=1,N),I=1,NS)
DO 103 II=1,NS
  I=II+N
DO 103 JJ=1,NS
  J=JJ+N
CALL G3G(GB,G,M,NT,XX,YY,ZZ,XN,YN,ZN,S,I,II,J,JJ)

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103 CONTINUE

write(*,*) '4'

WRITE(L) ((GB(I,J),J=1,NS),I=1,NS)

WRITE(L1) ((G(I,J),J=1,NS),I=1,NS)

CALL MIR2(GB,G,M,N,NS,L,31)

CALL MTR2(GB,G,M,N,NS,31,L1,L)

RETURN

END

SUBROUTINE G3G(GB,G,M,NT,XX,YY,ZZ,XN,YN,ZN,S,I,II,J,JJ)

C=====

REAL GB(M,M),G(M,M)

REAL XX(NT),YY(NT),ZZ(NT),XN(NT),YN(NT),ZN(NT),S(NT)

PAI=3.1415927

IF(I.EQ.J) GO TO 203

R=SQRT((XX(I)-XX(J))**2+(YY(I)-YY(J))**2+(ZZ(I)-ZZ(J))**2)

RN=((XX(J)-XX(I))*XN(J)+(YY(J)-YY(I))*YN(J)+(ZZ(J)-ZZ(I))*ZN(J))

&/R*(-1)

GB(II,JJ)=0.5/PAI/R**2*RN*S(J) 尼羅河之旅

G(II,JJ)=0.5/PAI/R*S(J)

GO TO 103

203 GB(II,JJ)=1.0

G(II,JJ)=SQRT(0.9945/PAI*S(J))

103 CONTINUE

RETURN

END

SUBROUTINE SEKI(A,B,M,NA,NK,NB)

REAL A(M,M),B(M,M),C(3000)

DO 100 I=1,NA

DO 101 K=1,NK

C(K)=A(I,K)

101 CONTINUE

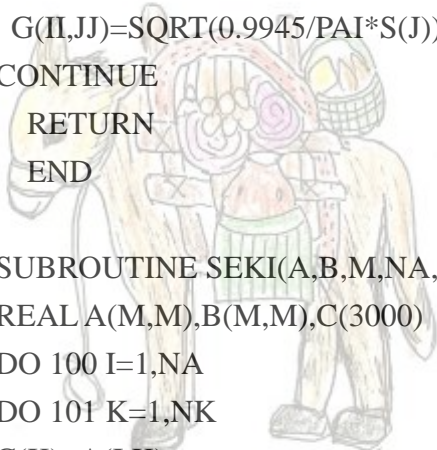
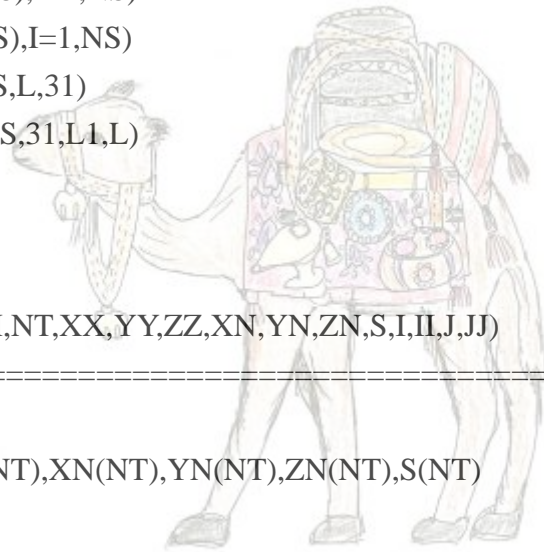
DO 100 J=1,NB

R=0.

DO 102 K=1,NK

R=R+C(K)*B(K,J)

102 CONTINUE



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A(I,J)=R
100 CONTINUE
    write(*,*) 'seki'
RETURN
END

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SUBROUTINE MINVS(A,KO,N,EPS,ILL)
C *****

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```

REAL A(KO,KO)
INTEGER X(3000)
LOGICAL B
ILL=0
IF((KO.GE.N).AND.(N.GE.2).AND.(N.LE.3000).AND.(EPS.GT.0.0))
/GO TO 1
ILL=30000
RETURN

```

```

1 DO 10 I=1,N
X(I)=I
10 CONTINUE
DO 110 K=1,N
M=K
W=0.0

```

```

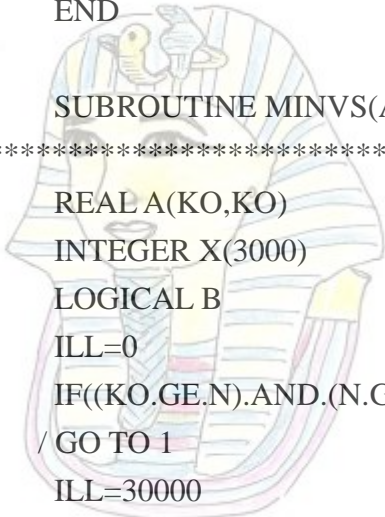
DO 20 I=K,N
ABSA=ABS(A(I,K))
IF(ABSA.LE.W) GO TO 20
W=ABSA
M=I
20 CONTINUE
IF(M.EQ.K) GO TO 50
L=X(M)
X(M)=X(K)
X(K)=L

```

```

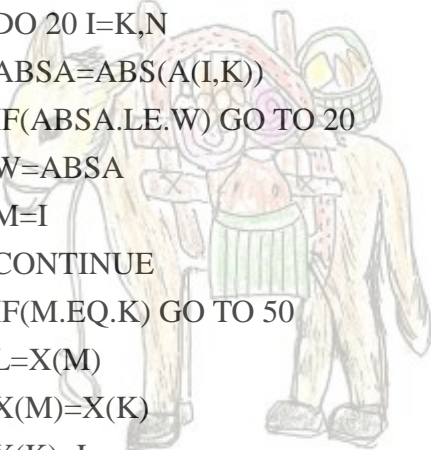
DO 40 J=1,N
W=A(K,J)
A(K,J)=A(M,J)
A(M,J)=W
40 CONTINUE
50 IF(ABS(A(K,K)).GE.EPS) GO TO 60

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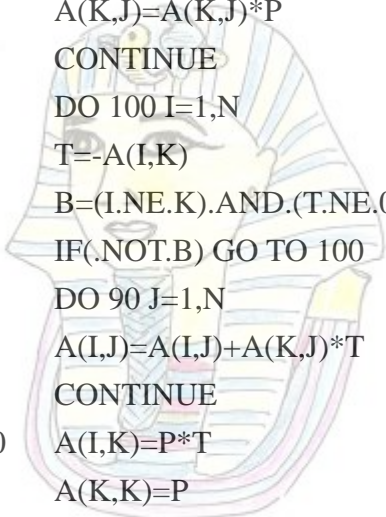


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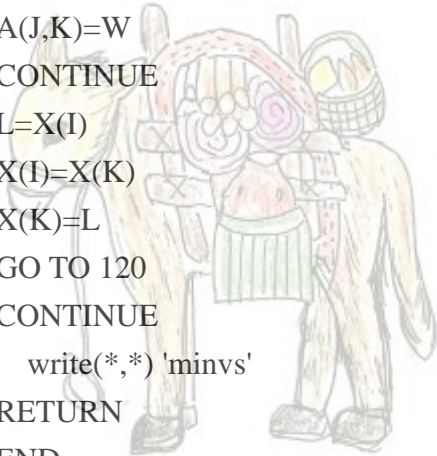
ILL=K
RETURN
60 P=1.0/A(K,K)
DO 70 J=1,N
A(K,J)=A(K,J)*P
70 CONTINUE
DO 100 I=1,N
T=-A(I,K)
B=(I.NE.K).AND.(T.NE.0.0)
IF(.NOT.B) GO TO 100
DO 90 J=1,N
A(I,J)=A(I,J)+A(K,J)*T
90 CONTINUE
100 A(I,K)=P*T
A(K,K)=P
110 CONTINUE
DO 140 I=1,N
120 IF(X(I).EQ.I) GO TO 140
K=X(I)
DO 130 J=1,N
W=A(J,I)
A(J,I)=A(J,K)
A(J,K)=W
130 CONTINUE
L=X(I)
X(I)=X(K)
X(K)=L
GO TO 120
140 CONTINUE
write(*,*) 'minvs'
RETURN
END

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C

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SUBROUTINE MTR2 (A,B,Nx,N,NS,L,M,K)
REAL A(NX,NX),B(NX,NX)
write(*,*) 'begin mtr2'
REWIND L

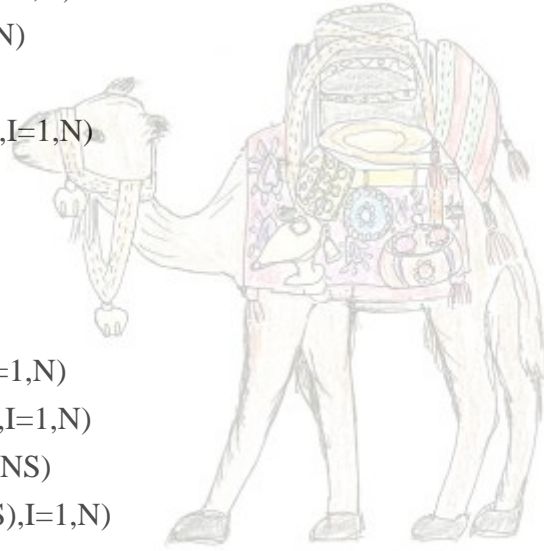
```

100

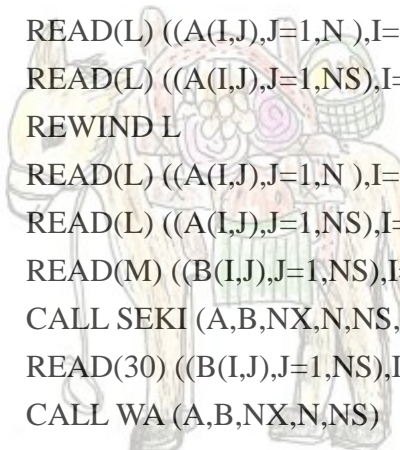
```

REWIND M
READ(L) ((A(I,J),J=1,N),I=1,N)
READ(M) ((B(I,J),J=1,N),I=1,N)
CALL SEKI(A,B,NX,N,N,N)
REWIND 30
WRITE(30) ((A(I,J),J=1,N),I=1,N)
DO 100 I=1,N
DO 100 J=1,N
B(I,J)=A(I,J)
BACKSPACE L
READ(L) ((A(I,J),J=1,N),I=1,N)
READ(M) ((B(I,J),J=1,NS),I=1,N)
CALL SEKI(A,B,NX,N,N,NS)
WRITE(30) ((A(I,J),J=1,NS),I=1,N)
READ(L) ((A(I,J),J=1,NS),I=1,N)
READ(M) ((B(I,J),J=1,N),I=1,NS)
CALL SEKI(A,B,NX,N,NS,N)
REWIND 30
READ(30) ((B(I,J),J=1,N),I=1,N)
CALL WA(A,B,NX,N,N)
REWIND K
WRITE(K) ((B(I,J),J=1,N),I=1,N)
READ(L) ((A(I,J),J=1,N),I=1,NS)
READ(L) ((A(I,J),J=1,NS),I=1,NS)
REWIND L
READ(L) ((A(I,J),J=1,N),I=1,N)
READ(L) ((A(I,J),J=1,NS),I=1,N)
READ(M) ((B(I,J),J=1,NS),I=1,NS)
CALL SEKI(A,B,NX,N,NS,NS)
READ(30) ((B(I,J),J=1,NS),I=1,N)
CALL WA(A,B,NX,N,NS)
WRITE(K) ((B(I,J),J=1,NS),I=1,N)
REWIND M
READ(M) ((B(I,J),J=1,N),I=1,N)
READ(L) ((A(I,J),J=1,N),I=1,NS)
CALL SEKI(A,B,NX,NS,N,N)
REWIND 30
WRITE(30) ((A(I,J),J=1,N),I=1,NS)

```



載滿珠寶的駱駝



載滿寶物的馬



阿拉丁神燈

100 繪圖 羅河之旅


```
READ(L) ((B(I,J),J=1,NS),I=1,NS)
```

```
BACKSPACE L
```

```
BACKSPACE L
```

```
READ(L) ((A(I,J),J=1,N),I=1,NS)
```

```
READ(M) ((B(I,J),J=1,NS),I=1,N)
```

```
CALL SEKI (A,B,NX,NS,N,NS)
```

```
WRITE(30) ((A(I,J),J=1,NS),I=1,NS)
```

```
READ(L) ((A(I,J),J=1,NS),I=1,NS)
```

```
READ(M) ((B(I,J),J=1,N),I=1,NS)
```

```
CALL SEKI (A,B,NX,NS,NS,N)
```

```
REWIND 30
```

```
READ(30) ((B(I,J),J=1,N),I=1,NS)
```

```
CALL WA (A,B,NX,NS,N)
```

```
WRITE(K) ((B(I,J),J=1,N),I=1,NS)
```

```
BACKSPACE L
```

```
READ(L) ((A(I,J),J=1,NS),I=1,NS)
```

```
READ(M) ((B(I,J),J=1,NS),I=1,NS)
```

```
CALL SEKI (A,B,NX,NS,NS,NS)
```

```
READ(30) ((B(I,J),J=1,NS),I=1,NS)
```

```
CALL WA (B,A,NX,NS,NS)
```

```
WRITE(K) ((A(I,J),J=1,NS),I=1,NS)
```

```
write(*,*) 'end of mtr2'
```

```
RETURN
```

```
END
```

```
C  
C  
C
```

```
SUBROUTINE MIR2(A,B,Nx,N,NS,L,M)
```

```
C*****
```

```
C Calculate large matrix A(n+ns,n+ns)'s inverse [A1]n,n [A2]n,ns *
```

```
C read A from unit L file, after calculating, [A3]ns,n [A4]ns,ns *
```

```
C write to unit M file with : *
```

```
C [M1] = [ [A1] - [A2] [A4]^ [A3] ]^ , ^ means inverse *
```

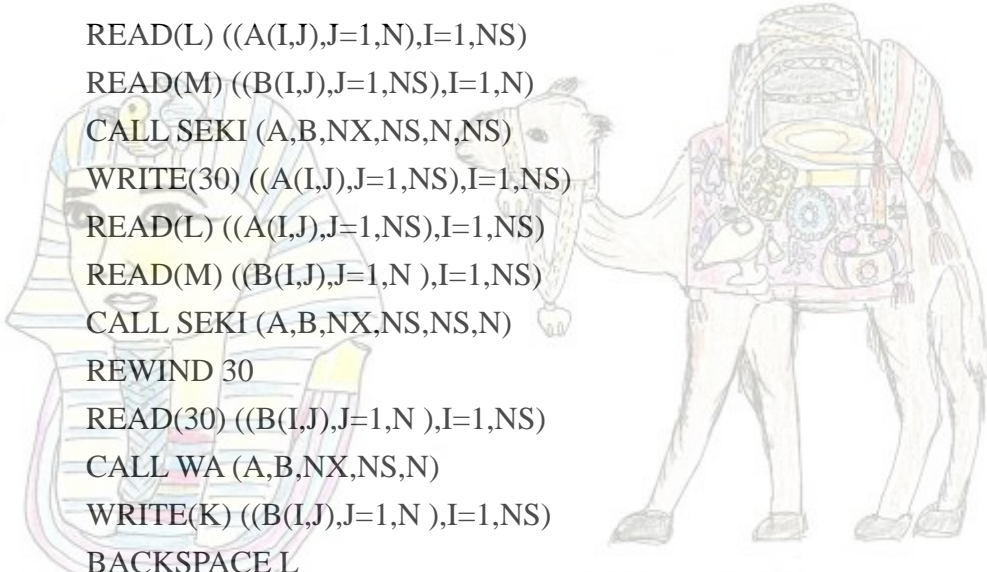
```
C [M3] = - [A4]^ [A3] [M1] *
```

```
C [M4] = [ [A4] - [A3] [A1]^ [A2] ]^ *
```

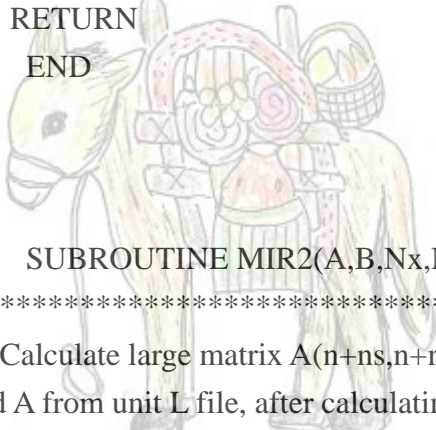
```
C [M2] = - [A1]^ [A2] [M4] *
```

```
C*****
```

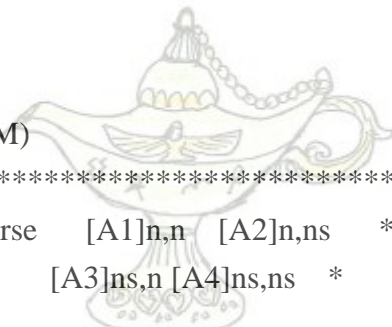
```
REAL A(NX,NX),B(NX,NX)
```



載滿珠寶的駱駝



載滿貨物的驢子

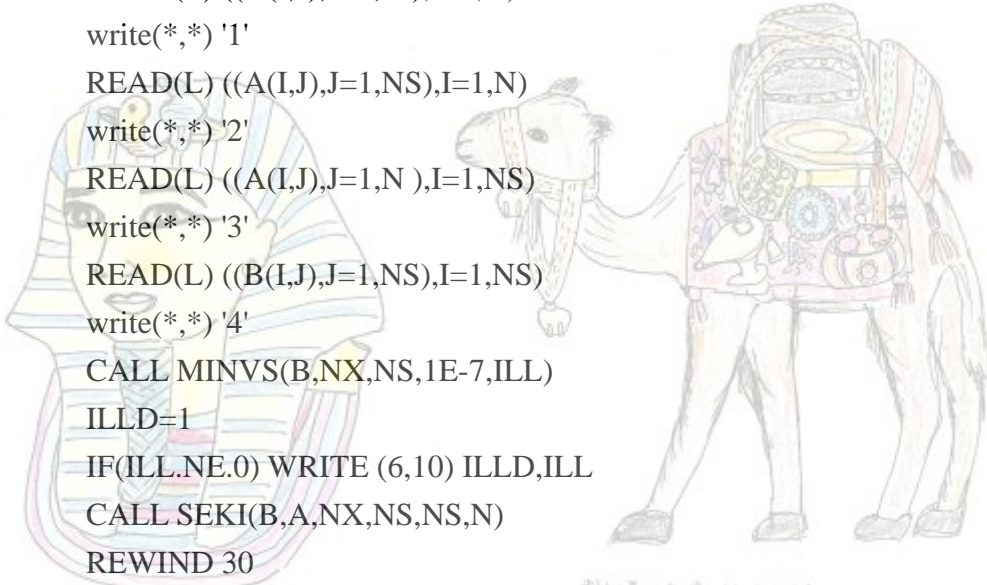


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```

write(*,*) 'begin mir2'
REWIND L
READ(L) ((A(I,J),J=1,N ),I=1,N)
write(*,*) '1'
READ(L) ((A(I,J),J=1,NS),I=1,N)
write(*,*) '2'
READ(L) ((A(I,J),J=1,N ),I=1,NS)
write(*,*) '3'
READ(L) ((B(I,J),J=1,NS),I=1,NS)
write(*,*) '4'
CALL MINVS(B,NX,NS,1E-7,ILL)
ILLD=1
IF(ILL.NE.0) WRITE (6,10) ILLD,ILL
CALL SEKI(B,A,NX,NS,NS,N)
REWIND 30
WRITE(30) ((B(I,J),J=1,N),I=1,NS)

```



載滿珠寶的駱駝

```

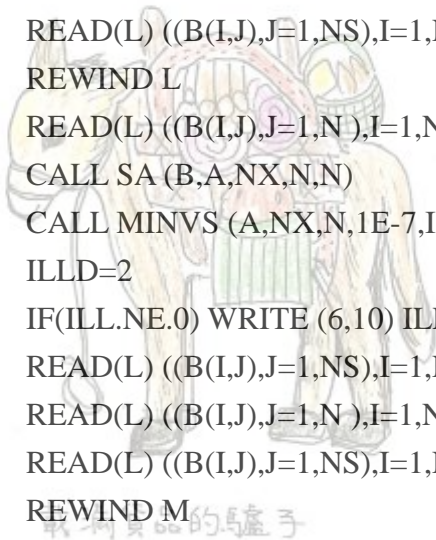
BACKSPACE L
BACKSPACE L
BACKSPACE L    2011 埃及尼羅河之旅

```

```

READ(L) ((A(I,J),J=1,NS),I=1,N)
CALL SEKI (A,B,NX,N,NS,N)
READ(L) ((B(I,J),J=1,N ),I=1,NS)
READ(L) ((B(I,J),J=1,NS),I=1,NS)
REWIND L
READ(L) ((B(I,J),J=1,N ),I=1,N )
CALL SA (B,A,NX,N,N)
CALL MINVS (A,NX,N,1E-7,ILL)
ILLD=2
IF(ILL.NE.0) WRITE (6,10) ILLD,ILL
READ(L) ((B(I,J),J=1,NS),I=1,N)
READ(L) ((B(I,J),J=1,N ),I=1,NS)
READ(L) ((B(I,J),J=1,NS),I=1,NS)
REWIND M
WRITE(M) ((A(I,J),J=1,N ),I=1,N)
REWIND 30
READ(30) ((B(I,J),J=1,N ),I=1,NS)
CALL SEKI (B,A,NX,NS,N,N)
DO 100 I=1,NS

```



載有寶物的馬騾子

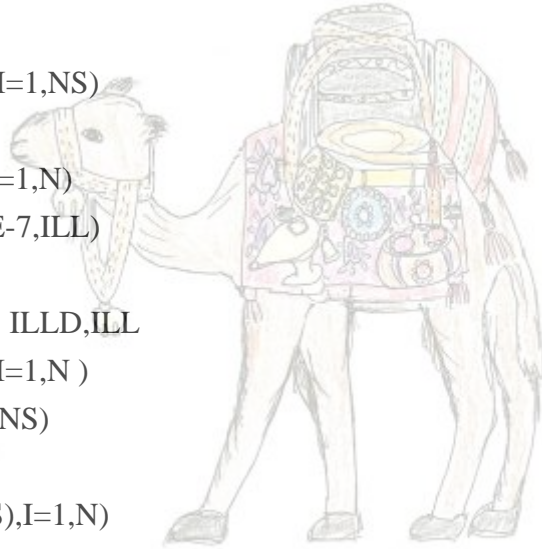
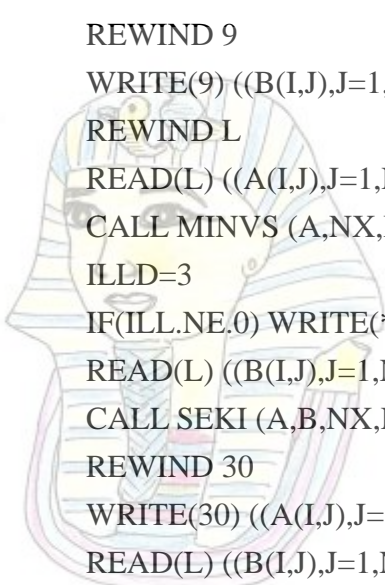


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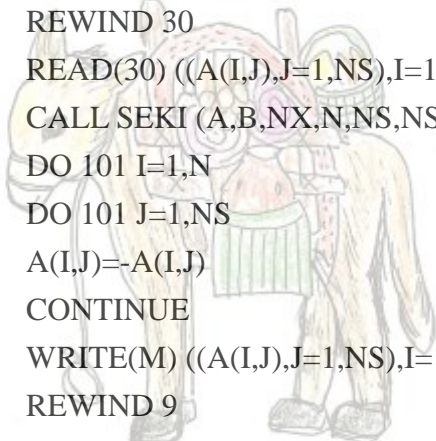
```

DO 100 J=1,N
B(I,J)=-B(I,J)
100 CONTINUE
REWIND 9
WRITE(9) ((B(I,J),J=1,N ),I=1,NS)
REWIND L
READ(L) ((A(I,J),J=1,N ),I=1,N)
CALL MINVS (A,NX,N,1E-7,ILL)
ILLD=3
IF(ILL.NE.0) WRITE(*,10) ILLD,ILL
READ(L) ((B(I,J),J=1,NS),I=1,N)
CALL SEKI (A,B,NX,N,N,NS)
REWIND 30
WRITE(30) ((A(I,J),J=1,NS),I=1,N)
READ(L) ((B(I,J),J=1,N ),I=1,NS)
CALL SEKI (B,A,NX,NS,N,NS)
READ(L) ((A(I,J),J=1,NS),I=1,NS)
CALL SA (A,B,NX,NS,NS)
CALL MINVS (B,NX,NS,1E-7,ILL)
ILLD=4
IF(ILL.NE.0) WRITE(*,10) ILLD,ILL
WRITE(9) ((B(I,J),J=1,NS),I=1,NS)
REWIND 30
READ(30) ((A(I,J),J=1,NS),I=1,N)
CALL SEKI (A,B,NX,N,NS,NS)
DO 101 I=1,N
DO 101 J=1,NS
A(I,J)=-A(I,J)
101 CONTINUE
WRITE(M) ((A(I,J),J=1,NS),I=1,N)
REWIND 9
READ(9) ((A(I,J),J=1,N ),I=1,NS)
WRITE(M) ((A(I,J),J=1,N),I=1,NS)
READ(9) ((A(I,J),J=1,NS),I=1,NS)
WRITE(M) ((A(I,J),J=1,NS),I=1,NS)
10 FORMAT(1X,'ILL(',I1,')=' ,I7)
write(*,*) 'end of mir2'
RETURN

```



載滿珠寶的駱駝

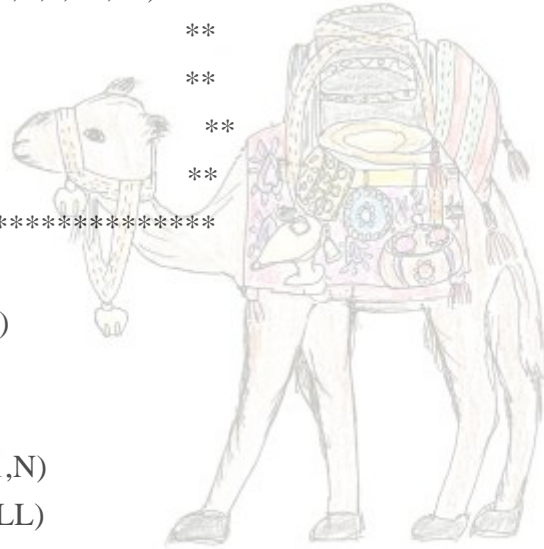


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END

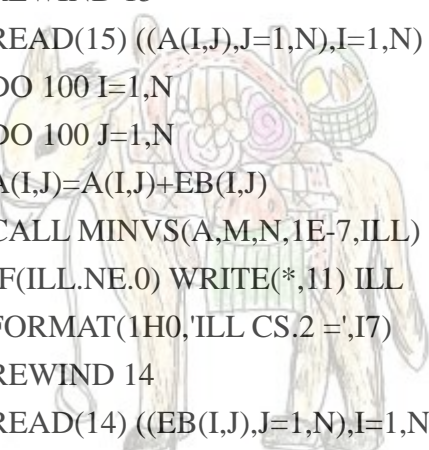
SUBROUTINE CS(A,EB,M,N,L,F,FS,KI)

```
C ** **
C ** **
C ** DATA INPUT : UNIT 15 **
C ** TEMP. FILE : UNIT 14 **
C *****
REAL A(M,M),EB(M,M)
COMPLEX IM,RS,F(L),FS(L)
IM=(0.,1.)
REWIND 15
READ(15) ((A(I,J),J=1,N),I=1,N)
CALL MINVS(A,M,N,1E-7,ILL)
IF(ILL.NE.0) WRITE(*,10) ILL
10 FORMAT(1H0,'ILL CS.1 ='I7)
READ(15) ((EB(I,J),J=1,N),I=1,N)
CALL SEKI(A,EB,M,N,N,N)
REWIND 14
WRITE(14) ((A(I,J),J=1,N),I=1,N)
CALL SEKI(EB,A,M,N,N,N)
REWIND 15
READ(15) ((A(I,J),J=1,N),I=1,N)
DO 100 I=1,N
DO 100 J=1,N
100 A(I,J)=A(I,J)+EB(I,J)
CALL MINVS(A,M,N,1E-7,ILL)
IF(ILL.NE.0) WRITE(*,11) ILL
11 FORMAT(1H0,'ILL CS.2 ='I7)
REWIND 14
READ(14) ((EB(I,J),J=1,N),I=1,N)
CALL SEKI(EB,A,M,N,N,N)
IF(KI.EQ.1) GO TO 500
DO 101 I=1,N
RS=(0.,0.)
DO 102 J=1,N
RS=RS+(A(I,J)-IM*EB(I,J))*F(J)
102 CONTINUE
```



載滿珠寶的駱駝

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```

      FS(I)=RS
101  CONTINUE
500  CONTINUE
      RETURN
      END
C*****
      SUBROUTINE G2(GB,G,M,N,XM,YM,SM,XN,YN,KH,KI,H,HB,NX,F1,F2,HO,L)
      REAL GB(M,M),G(M,M),XM(N),YM(N),SM(N),XN(N),YN(N),KH
      COMPLEX IM,H(NX,NX),HB(NX,NX),F1(L),F2(L),RS,RT
      PAI=3.1415927
      IM=(0.,1.)
      DO 100 I=1,N
      DO 100 J=1,N
      IF(I.EQ.J) GO TO 200
      R=SQRT((XM(I)-XM(J))**2+(YM(I)-YM(J))**2)
      RK=KH*R
      CALL BESJNS(RK,0,BJO,ILL)
      IF(ILL.NE.0) WRITE(*,1) ILL 埃及尼羅河之旅
1    FORMAT(1H0,'ILL G2 =',I7)
      CALL BESJNS(RK,1,BJ1,ILL)
      IF(ILL.NE.0) WRITE(*,1) ILL
      CALL BESYNS(RK,0,BYO,ILL)
      IF(ILL.NE.0) WRITE(*,1) ILL
      CALL BESYNS(RK,1,BY1,ILL)
      IF(ILL.NE.0) WRITE(*,1) ILL
      RN=((XM(J)-XM(I))*YN(J)-(YM(J)-YM(I))*XN(J))/R
      RS=0.5*IM*KH*(BJ1+IM*BY1)*SM(J)*RN
      RT=-0.5*IM*(BJO+IM*BYO)*SM(J)/HO
      GO TO 101
200  IF(KI.EQ.1) RS=(-1.,0.)
      IF(KI.EQ.2) RS=(1.,0.)
      RT=(ALOG(KH*SM(J)/4.)-0.42278-IM*PAI/2.)/PAI*SM(J)/HO
101  GB(I,J)=REAL(RS)
      G(I,J)=AIMAG(RS)
100  HB(I,J)=RT
      REWIND 15
      WRITE(15)((GB(I,J),J=1,N),I=1,N)

```

```

WRITE(15) ((G(I,J),J=1,N),I=1,N)
CALL CS(GB,G,M,N,L,F1,F2,1)
DO 102 I=1,N
DO 102 J=1,N
RS=(0.,0.)
DO 103 K=1,N
103 RS=RS+(GB(I,K)-IM*G(I,K))*HB(K,J)
102 H(I,J)=RS
RETURN
END

```

C*****

```

SUBROUTINE BESJNS(X,N,BJN,ILL)

```

```

BJN=0.0
IF(N) 10,20,20
10 ILL=1
RETURN
20 IF(X) 30,21,31
21 IF(N.GT.1) GO TO 30
ILL=0
IF(N.EQ.0) BJN=1.0
RETURN
30 ILL=2
RETURN
31 IF(X-15.0) 32,32,34
32 NTEST=20.0+10.0*X-X*X/3.0
GO TO 36
34 NTEST=110.0+X/2.0
36 IF(N-NTEST) 40,38,38
38 ILL=3
RETURN

```

```

40 ILL=0

```

C

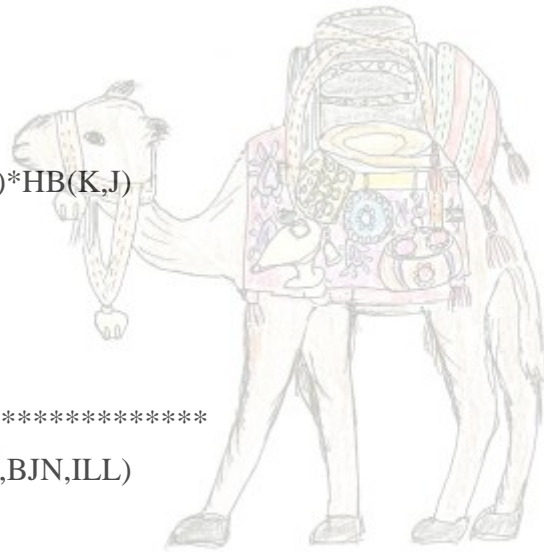
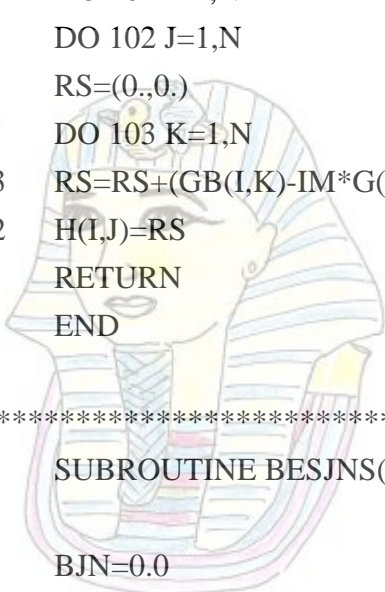
C -- *** COMPUTE STARTING VALUE OF M *** --

C

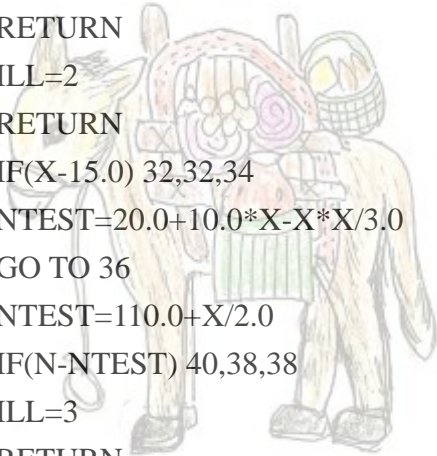
```

N1=0
IF(X.LT.1.0) GO TO 54

```



載滿珠寶的駱駝



載滿貨品的驢子

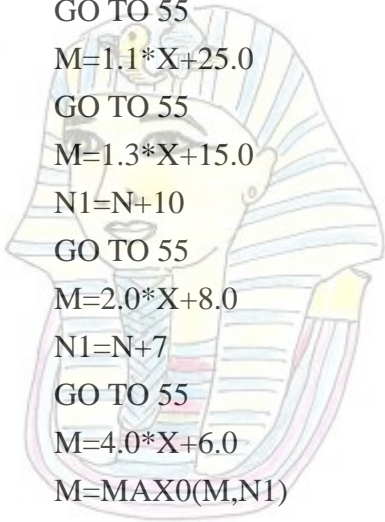


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```

IF(X.LT.10.0) GO TO 53
IF(X.LT.50.0) GO TO 52
IF(X.LT.100.0) GO TO 51
M=X+35.0
GO TO 55
51 M=1.1*X+25.0
GO TO 55
52 M=1.3*X+15.0
N1=N+10
GO TO 55
53 M=2.0*X+8.0
N1=N+7
GO TO 55
54 M=4.0*X+6.0
55 M=MAX0(M,N1)
C
C --- ** SET F(M),F(M-1) ** ---
C

```



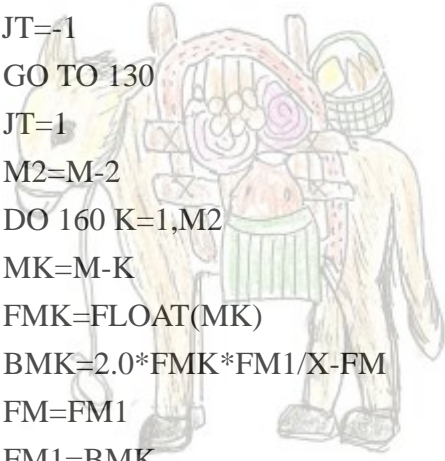
載滿珠寶的駱駝

FM1=1.0E-30 2011 埃及尼羅河之旅

```

FM=0.0
ALPHA=0.0
IF(M-(M/2)*2) 120,110,120
110 JT=-1
GO TO 130
120 JT=1
130 M2=M-2
DO 160 K=1,M2
MK=M-K
FMK=FLOAT(MK)
BMK=2.0*FMK*FM1/X-FM
FM=FM1
FM1=BMK
IF(MK-N-1) 150,140,150
140 BJN=BMK
150 JT=-JT
S=1+JT
160 ALPHA=ALPHA+BMK*S
BMK=2.0*FM1/X-FM

```



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```

IF(N) 180,170,180
170  BFN=BMK
180  ALPHA=ALPHA+BMK
      BFN=BFN/ALPHA
      RETURN
      END

```

C*****

```

SUBROUTINE BESYNS(X,N,BFN,ILL)

```

C*****

```

DOUBLE PRECISION TERM

```

```

BFN=-1.0E30

```

```

IF(N) 180,10,10

```

```

10  ILL=0

```

```

IF(X) 190,11,20

```

```

11  IF(N.GT.1) GO TO 190

```

```

      RETURN

```

```

20  PI=3.141592653

```

```

IF(X-4.0) 40,40,30

```

```

30  T=4.0/X

```

```

      T=T*T

```

```

      P0=((( (-0.0000037043*T+0.0000173565)*T-0.0000487613)*T
&+0.0001734300)*T-0.0017530620)*T+0.3989422793

```

```

      Q0=((( (0.0000032312*T-0.0000142078)*T+0.0000342468)*T
&-0.0000869791)*T+0.0004564324)*T-0.0124669441

```

```

      P1=((( (0.0000042414*T-0.0000200920)*T+0.0000580759)*T
&-0.0002232030)*T+0.0029218256)*T+0.3989422819

```

```

      Q1=((( (-0.0000036594*T+0.0000162200)*T-0.0000398708)*T
&+0.0001064741)*T-0.0006390400)*T+0.0374008364

```

```

      A=SQRT(2.0*PI)

```

```

      B=4.0*A

```

```

      P0=A*P0

```

```

      Q0=B*Q0/X

```

```

      P1=A*P1

```

```

      Q1=B*Q1/X

```

```

      A=X-PI/4.0

```

```

      B=SQRT(2.0/(PI*X))

```

```

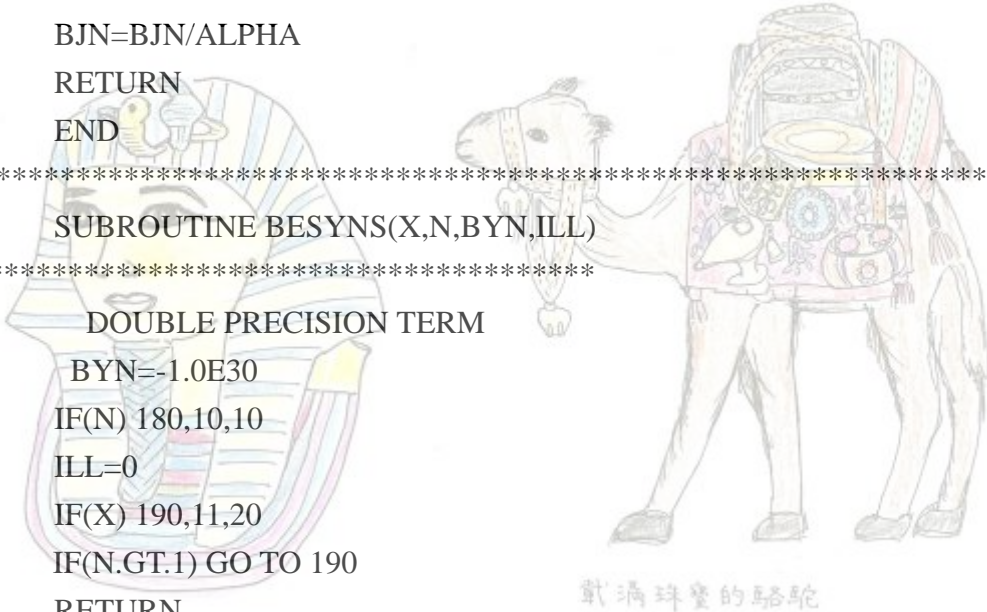
      Y0=B*(P0*SIN(A)+Q0*COS(A))

```

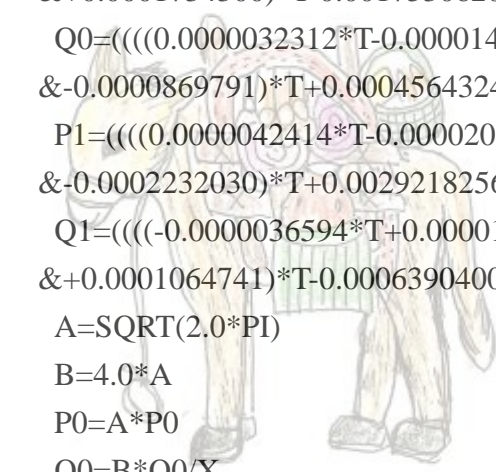
```

      Y1=B*(-P1*COS(A)+Q1*SIN(A))

```



載滿珠寶的駱駝



載滿貨品的馬廬子



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GO TO 90

C

C --- ** COMPUTE Y0,Y1 FOR X <= 4 ** ---

C

40 XX=X/2.0
X2=XX*XX
T=ALOG(XX)+0.5772156649
SUM=0.0
TERM=T
Y0=T

DO 70 L=1,15
IF(L-1) 50,60,50
50 SUM=SUM+1.0/FLOAT(L-1)
60 FLL=L

TS=T-SUM
TERM=(TERM*(-X2)/(FLL*FLL))*(1.0-1.0/(FLL*TS))

70 Y0=Y0+TERM
TERM=XX*(T-0.5)

SUM=0.0 2011 埃及尼羅河之旅

Y1=TERM
DO 80 L=2,16
SUM=SUM+1.0/FLOAT(L-1)

FLL=L
FL1=FLL-1.0
TS=T-SUM
TERM=(TERM*(-X2)/(FL1*FLL))*((TS-0.5/FLL)/(TS+0.5/FL1))

80 Y1=Y1+TERM
PI2=2.0/PI
Y0=PI2*Y0
Y1=-PI2/X+PI2*Y1

C

C --- ** CHECK IF ONLY Y0 OR Y1 IS DESIRED ** ---

C ** ----- **

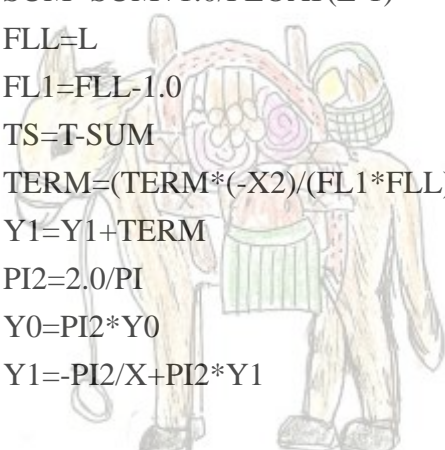
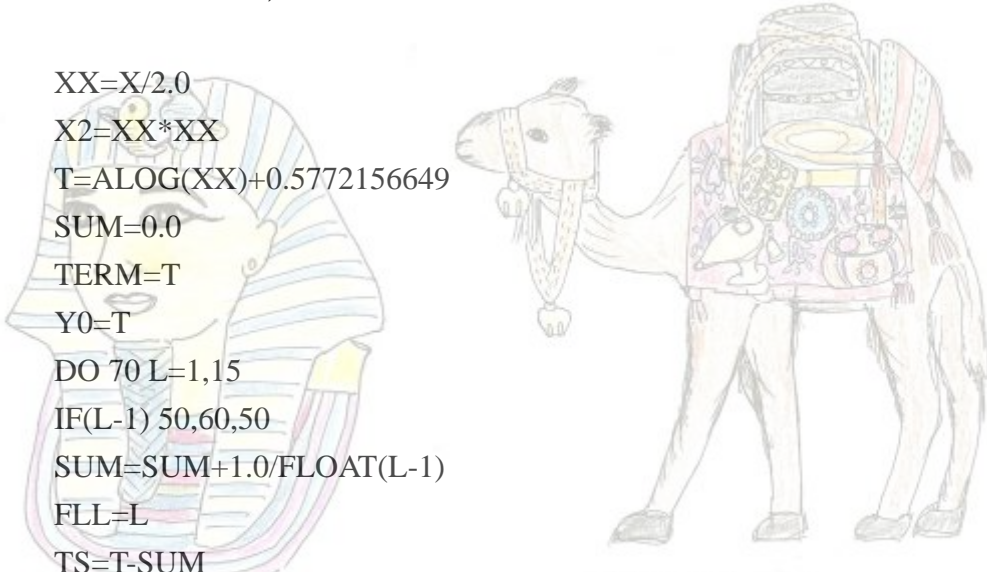
90 IF(N-1) 100,100,130

C ** ----- **

C --- ** RETURN EITHER Y0 OR Y1 AS REQUIRED ** ---

C ** ----- **

100 IF(N) 110,120,110



載滿貨品的馱子

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```

110  BYN=Y1
      RETURN
120  BYN=Y0
      RETURN

```

```

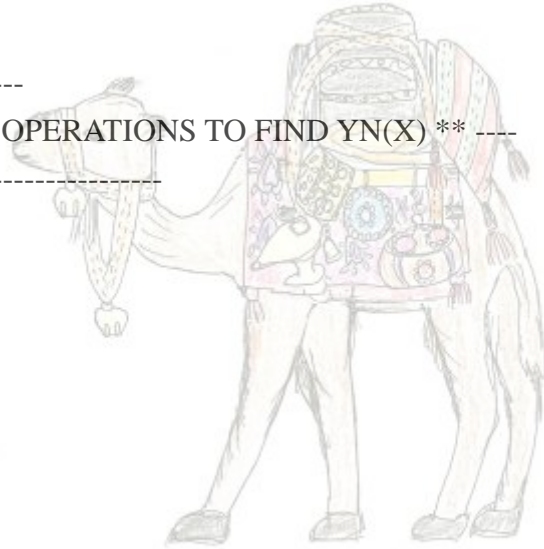
C -----
C --- ** PERFORM RECURRENCE OPERATIONS TO FIND YN(X) ** ---
C -----

```

```

130  YA=Y0
      YB=Y1
      K=1
140  T=FLOAT(2*K)/X
      YC=T*YB-YA
      K=K+1
      IF(K-N) 150,160,150
150  YA=YB
      YB=YC
      GO TO 140

```



載滿珠寶的駱駝

```

160  BYN=YC
      RETURN
180  ILL=1
      RETURN
190  ILL=2
      RETURN
      END

```

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c*****

```

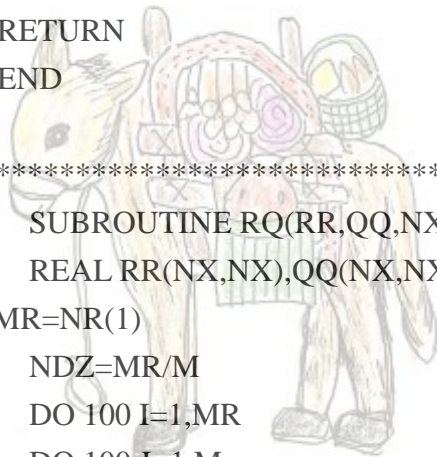
      SUBROUTINE RQ(RR,QQ,NX,MR,M,Z,ZZ,MT,KH)
      REAL RR(NX,NX),QQ(NX,NX),KH,Z(MT,4),ZZ(MT)

```

```

C ::::: MR=NR(1)
      NDZ=MR/M
      DO 100 I=1,MR
      DO 100 J=1,M
100  RR(I,J)=0
      DO 101 I=1,M
      DO 101 J=1,MR
101  QQ(I,J)=0
      DO 102 I=1,M
      I2=(I-1)*NDZ

```



載滿寶物的驢子

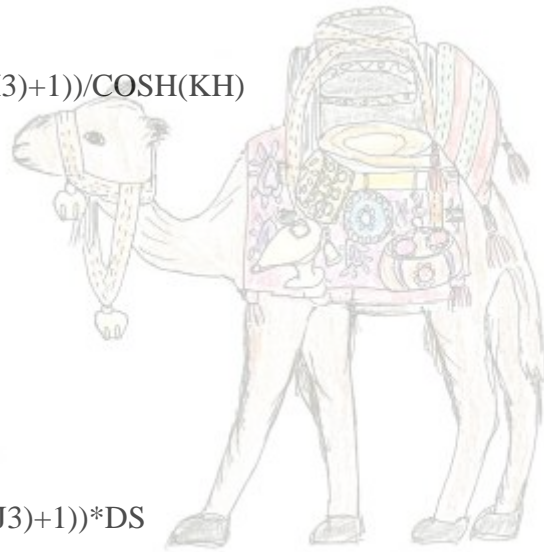
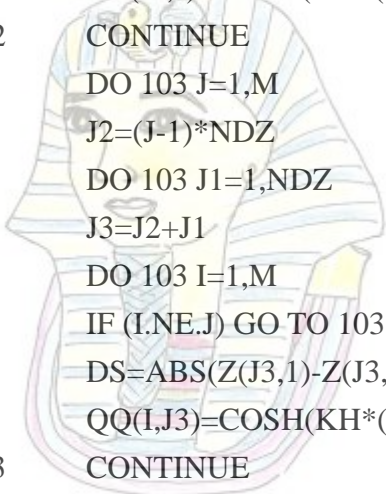


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```

DO 102 I1=1,NDZ
I3=I2+I1
DO 102 J=1,M
IF (J.NE.I) GO TO 102
RR(I3,J)=COSH(KH*(ZZ(I3)+1))/COSH(KH)
102 CONTINUE
DO 103 J=1,M
J2=(J-1)*NDZ
DO 103 J1=1,NDZ
J3=J2+J1
DO 103 I=1,M
IF (I.NE.J) GO TO 103
DS=ABS(Z(J3,1)-Z(J3,3))
QQ(I,J3)=COSH(KH*(ZZ(J3)+1))*DS
103 CONTINUE
RETURN
END

```



載滿珠寶的駱駝

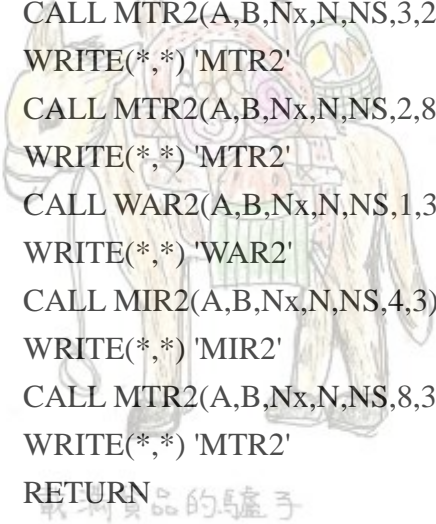
C*****

SUBROUTINE MIC2(A,B,NX,N,NS) 丁之旅

```

REAL A(NX,NX),B(NX,NX)
CALL MIR2(A,B,Nx,N,NS,1,3)
WRITE(*,*) 'MIR2'
CALL MTR2(A,B,Nx,N,NS,3,2,8)
WRITE(*,*) 'MTR2'
CALL MTR2(A,B,Nx,N,NS,2,8,3)
WRITE(*,*) 'MTR2'
CALL WAR2(A,B,Nx,N,NS,1,3,4)
WRITE(*,*) 'WAR2'
CALL MIR2(A,B,Nx,N,NS,4,3)
WRITE(*,*) 'MIR2'
CALL MTR2(A,B,Nx,N,NS,8,3,4)
WRITE(*,*) 'MTR2'
RETURN
END

```



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C*****

```

SUBROUTINE WAR2(A,B,Nx,N,NS,L,M,K)
REAL A(NX,NX),B(NX,NX)
REWIND L

```

```

REWIND M
REWIND K
READ(L) ((A(I,J),J=1,N),I=1,N)
READ(M) ((B(I,J),J=1,N),I=1,N)
CALL WA(B,A,NX,N,N)
WRITE(K) ((A(I,J),J=1,N),I=1,N)
READ(L) ((A(I,J),J=1,NS),I=1,N)
READ(M) ((B(I,J),J=1,NS),I=1,N)
CALL WA(B,A,NX,N,NS)
WRITE(K) ((A(I,J),J=1,NS),I=1,N)
READ(L) ((A(I,J),J=1,N),I=1,NS)
READ(M) ((B(I,J),J=1,N),I=1,NS)
CALL WA(B,A,NX,NS,N)
WRITE(K) ((A(I,J),J=1,N),I=1,NS)
READ(L) ((A(I,J),J=1,NS),I=1,NS)
READ(M) ((B(I,J),J=1,NS),I=1,NS)
CALL WA(B,A,NX,NS,NS)
WRITE(K) ((A(I,J),J=1,NS),I=1,NS)
RETURN
END

```

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C

C8*****

```

SUBROUTINE CQ2(A,B,C,NX,N,NS,NN)
REAL A(NX,NX),B(NX,NX),C(NX,8)
CALL MIC2(A,B,NX,N,NS)
REWIND 31
REWIND 32
DO 200 IP=1,NN
REWIND 3
REWIND 4
READ(3) ((A(I,J),J=1,N),I=1,N)
READ(4) ((B(I,J),J=1,N),I=1,N)
READ(31) (C(I,1),I=1,N)
READ(31) (C(I,2),I=1,NS)
READ(31) (C(I,3),I=1,N)
READ(31) (C(I,4),I=1,NS)
DO 100 I=1,N
R=0.

```



載滿珠寶的駱駝

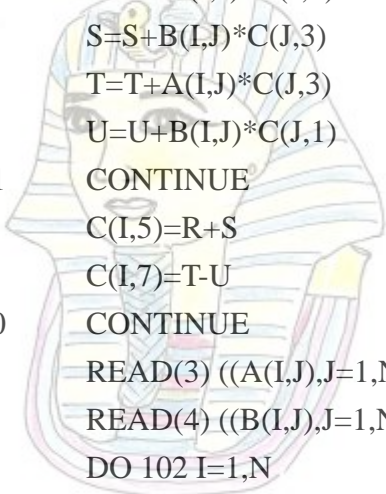


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```

S=0.
T=0.
U=0.
DO 101 J=1,N
R=R+A(I,J)*C(J,1)
S=S+B(I,J)*C(J,3)
T=T+A(I,J)*C(J,3)
U=U+B(I,J)*C(J,1)
101 CONTINUE
C(I,5)=R+S
C(I,7)=T-U
100 CONTINUE
READ(3)((A(I,J),J=1,NS),I=1,N)
READ(4)((B(I,J),J=1,NS),I=1,N)
DO 102 I=1,N

```



載滿珠寶的駱駝

U=0.

T=0.

S=0.

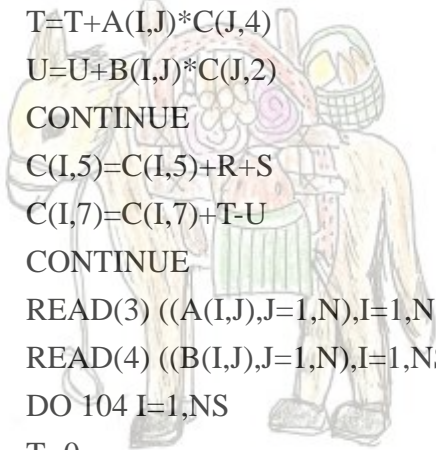
R=0.

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```

DO 103 J=1,NS
R=R+A(I,J)*C(J,2)
S=S+B(I,J)*C(J,4)
T=T+A(I,J)*C(J,4)
U=U+B(I,J)*C(J,2)
103 CONTINUE
C(I,5)=C(I,5)+R+S
C(I,7)=C(I,7)+T-U
102 CONTINUE
READ(3)((A(I,J),J=1,N),I=1,NS)
READ(4)((B(I,J),J=1,N),I=1,NS)
DO 104 I=1,NS

```



阿拉丁神燈

T=0.

U=0. 載滿貨品的驢子

R=0.

S=0.

DO 105 J=1,N

R=R+A(I,J)*C(J,1)

S=S+B(I,J)*C(J,3)

```

T=T+A(I,J)*C(J,3)
U=U+B(I,J)*C(J,1)
105 CONTINUE
C(I,6)=R+S
C(I,8)=T-U
104 CONTINUE
READ(3) ((A(I,J),J=1,NS),I=1,NS)
READ(4) ((B(I,J),J=1,NS),I=1,NS)
DO 106 I=1,NS
R=0.
S=0.
T=0.
U=0.
DO 107 J=1,NS
R=R+A(I,J)*C(J,2)
S=S+B(I,J)*C(J,4)
T=T+A(I,J)*C(J,4)
U=U+B(I,J)*C(J,2)

```

107 CONTINUE 2011 埃及尼羅河之旅

```

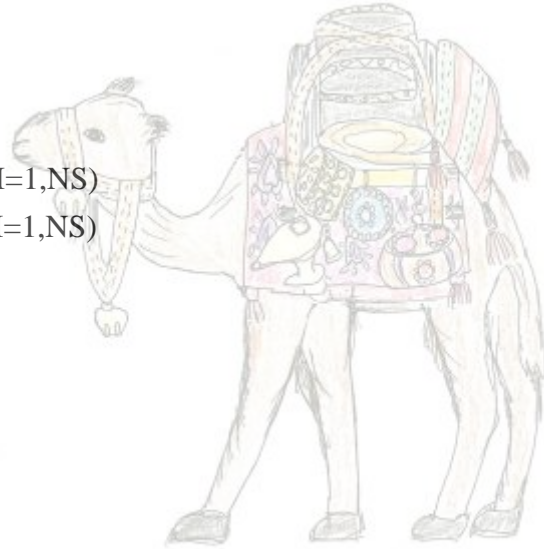
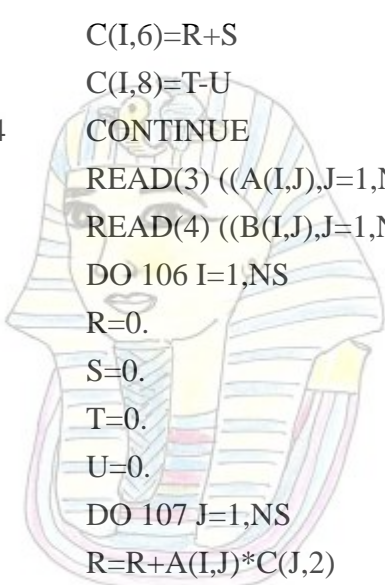
C(I,6)=C(I,6)+R+S
C(I,8)=C(I,8)+T-U
106 CONTINUE
WRITE(32) (C(I,5),I=1,N)
WRITE(32) (C(I,6),I=1,NS)
WRITE(32) (C(I,7),I=1,N)
WRITE(32) (C(I,8),I=1,NS)
200 CONTINUE
RETURN
END

```

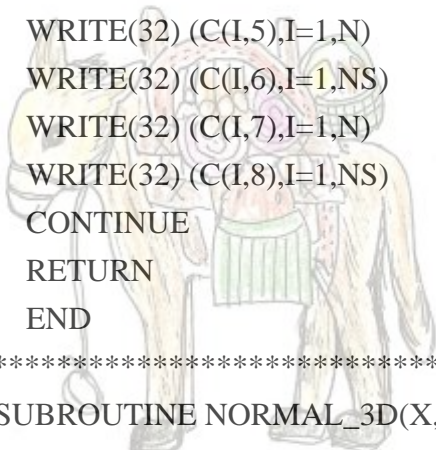
```

c*****
SUBROUTINE NORMAL_3D(X,Y,Z,XN,YN,ZN,XX,YY,ZZ,S,M,N,AF)
REAL X(M,4),Y(M,4),Z(M,4),XN(M),YN(M),ZN(M)
REAL AF(M),S(M),YY(M),XX(M),ZZ(M)
DO 100 I=1,N
R1=X(I,3)-X(I,1)
R2=Y(I,3)-Y(I,1)
R3=Z(I,3)-Z(I,1)
R4=X(I,4)-X(I,2)

```



載滿珠寶的駱駝

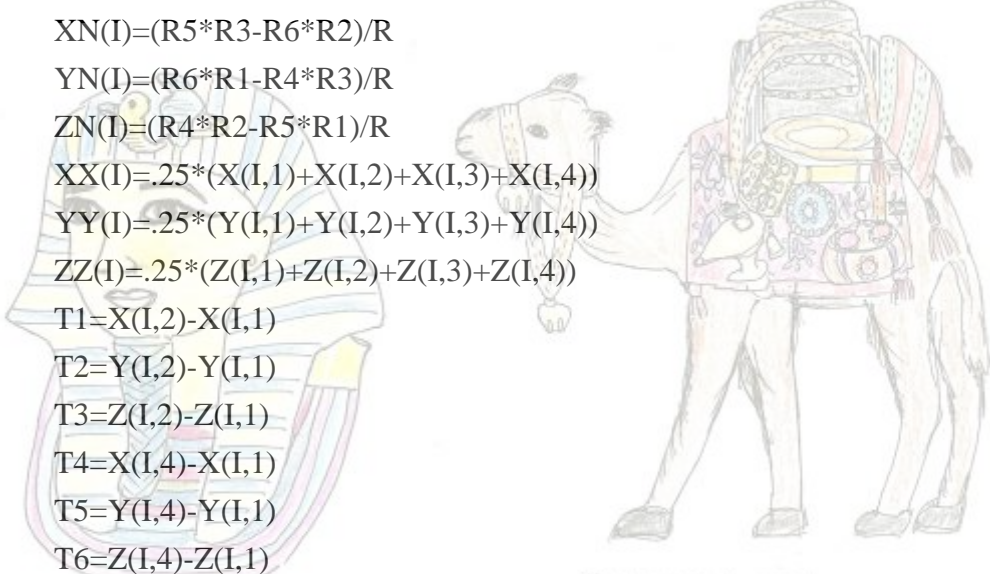


阿拉丁神燈

```

R5=Y(I,4)-Y(I,2)
R6=Z(I,4)-Z(I,2)
R=SQRT((R5*R3-R6*R2)**2+(R6*R1-R4*R3)**2+(R4*R2-R5*R1)**2)
XN(I)=(R5*R3-R6*R2)/R
YN(I)=(R6*R1-R4*R3)/R
ZN(I)=(R4*R2-R5*R1)/R
XX(I)=.25*(X(I,1)+X(I,2)+X(I,3)+X(I,4))
YY(I)=.25*(Y(I,1)+Y(I,2)+Y(I,3)+Y(I,4))
ZZ(I)=.25*(Z(I,1)+Z(I,2)+Z(I,3)+Z(I,4))
T1=X(I,2)-X(I,1)
T2=Y(I,2)-Y(I,1)
T3=Z(I,2)-Z(I,1)
T4=X(I,4)-X(I,1)
T5=Y(I,4)-Y(I,1)
T6=Z(I,4)-Z(I,1)

```



```

R=.5*SQRT((T2*R3-T3*R2)**2+(T3*R1-T1*R3)**2+(T1*R2-T2*R1)**2)
T=.5*SQRT((R2*T6-R3*T5)**2+(R3*T4-R1*T6)**2+(R1*T5-R2*T4)**2)

```

100 S(I)=R+T

DO 110 I=1,N 2011 埃及尼羅河之旅

```

H1=SQRT((X(I,1)-X(I,4))**2+(Y(I,1)-Y(I,4))**2+(Z(I,1)-Z(I,4))**2)
H2=SQRT((X(I,2)-X(I,3))**2+(Y(I,2)-Y(I,3))**2+(Z(I,2)-Z(I,3))**2)
W1=SQRT((X(I,2)-X(I,1))**2+(Y(I,2)-Y(I,1))**2+(Z(I,2)-Z(I,1))**2)
W2=SQRT((X(I,3)-X(I,4))**2+(Y(I,3)-Y(I,4))**2+(Z(I,3)-Z(I,4))**2)
AF(I)=(H1+H2)/(W1+W2)

```

110 CONTINUE

RETURN

END

SUBROUTINE INCIDENT(F0,F0B,X,Y,XN,YN,N,OI,KH)

C*****

C F0 :入射波速度勢

C F0B :入射波速度勢導函數

C OI :入射波方向(與 X 軸)

C KH : 入射波波數

C N : 等水深領域元素個數

C X,Y: 元素中點座標

C XN,YN : X,Y 法線分向

C*****



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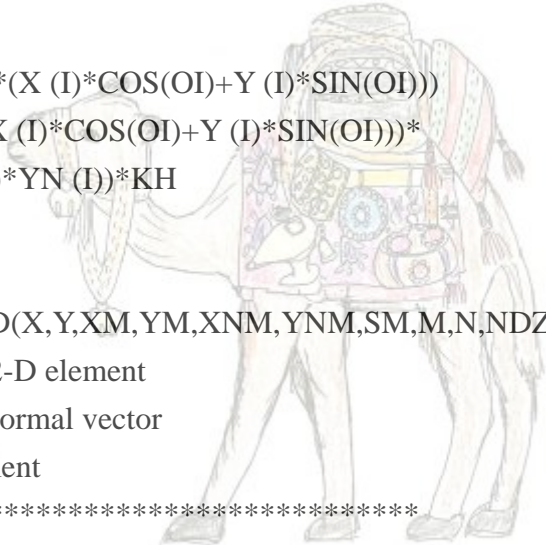
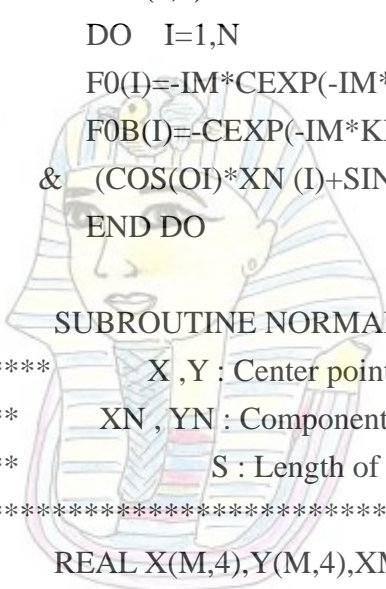
```

COMPLEX IM,F0(N),F0B(N)
REAL X(N),Y(N),XN(N),YN(N)
IM=(0,1)
DO I=1,N
F0(I)=-IM*CEXP(-IM*KH*(X(I)*COS(OI)+Y(I)*SIN(OI)))
F0B(I)=-CEXP(-IM*KH*(X(I)*COS(OI)+Y(I)*SIN(OI)))*
& (COS(OI)*XN(I)+SIN(OI)*YN(I))*KH
END DO

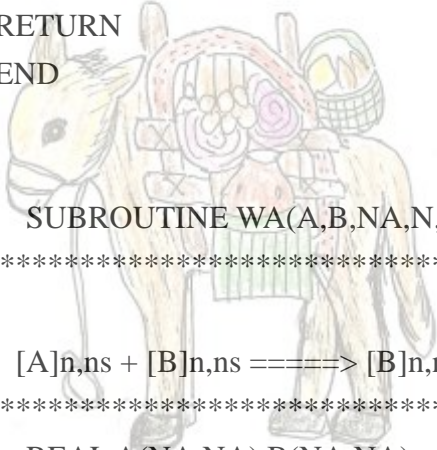
SUBROUTINE NORMAL_2D(X,Y,XM,YM,XNM,YNM,SM,M,N,NDZ)
C **** X , Y : Center point of 2-D element
C ** XN , YN : Component of normal vector
C ** S : Length of element
C ****
REAL X(M,4),Y(M,4),XM(N),YM(N),XNM(N),YNM(N),SM(N)
DO 100 I=1,N
II=I*NDZ
XM(I)=.5*(X(II,1)+X(II,3))
YM(I)=.5*(Y(II,1)+Y(II,3))
SM(I)=SQRT((X(II,1)-X(II,3))**2+(Y(II,1)-Y(II,3))**2)
YNM(I)= (X(II,3)-X(II,1))/SM(I)
100 XNM(I)=- (Y(II,3)-Y(II,1))/SM(I)
RETURN
END

C
C
SUBROUTINE WA(A,B,NA,N,NS)
C ****
C [A]n,ns + [B]n,ns =====> [B]n,ns
C ****
REAL A(NA,NA),B(NA,NA)
DO 100 I=1,N
DO 100 J=1,NS
B(I,J)=A(I,J)+B(I,J)
100 CONTINUE
write(*,*) 'wa'
RETURN

```



載滿珠寶的駱駝



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載有寶物的馬廬子

END

SUBROUTINE SA(A,B,NA,N,NS)

C*****

C

C [A]n,ns - [B]n,ns =====> [B]n,ns

C*****

REAL A(NA,NA),B(NA,NA)

DO 100 I=1,N

DO 100 J=1,NS

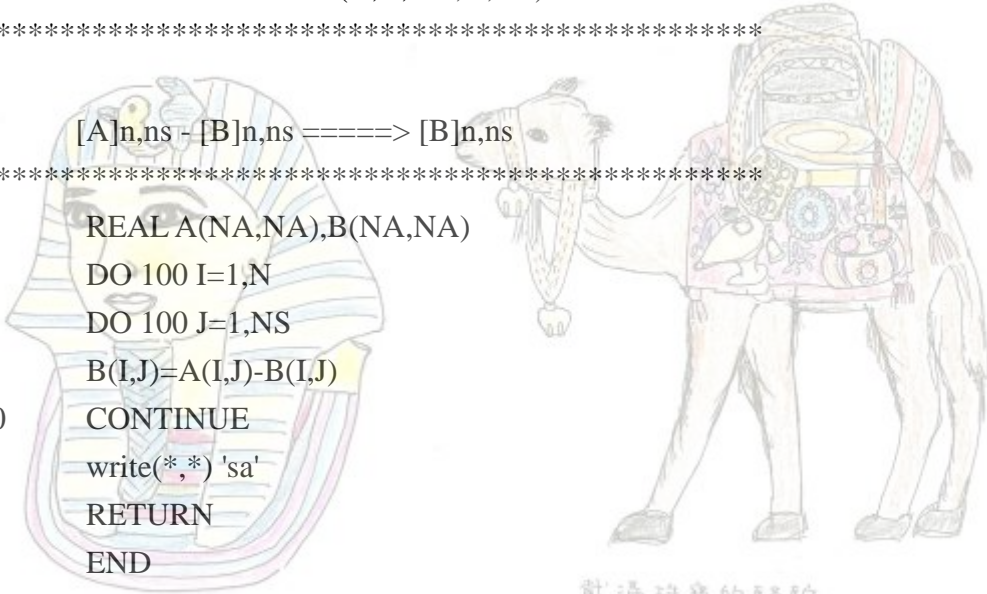
B(I,J)=A(I,J)-B(I,J)

100 CONTINUE

write(*,*) 'sa'

RETURN

END



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載滿貨品的驢子



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