```fortran
! _____
!
! This program computes daily mean TOA solar radiation
! from Jan to Dec (last day of month) and
! 90S to 90N every 5 degrees
!
! Input:  lat            [the latitude in degress]
!         j              [the Julian day number or day of year]
! Output: q              [the solar flux per unit surface area in W/m2
!         qdaily         [daily mean value of q]
!
! Author: Liang Yang 1/31/2002
! Modified: Xavier 9/13/2010
!_____
PROGRAM hmwk1_4
IMPLICIT NONE
INTEGER                             ::    i,j,k,ih
DOUBLE PRECISION,DIMENSION(12)      ::    doymon
CHARACTER(3),DIMENSION(12)          ::    mon
DOUBLE PRECISION,DIMENSION(12,37)   ::    qdaily1,qdaily2,qdaily
DOUBLE PRECISION                    ::    lat,t,qtot,phi,fe,delta,h,czen,q
DOUBLE PRECISION, PARAMETER         ::    pi = 3.1415926
REAL, PARAMETER                     ::    s0 = 1367. !Wm/2
doymon = (/1,32,60,91,121,152,182,213,244,274,305,335/) !Fisrt day of every month
mon = (/"Jan","Feb","Mar","Apr","May","Jun","Jul","Aug","Sep","Oct","Nov","Dec"/)
OPEN (100, FILE='hmwk1-4.dat')        !open/create a text file to store results
DO i=1,12                              !Do loop for the last day of each month
   IF (i.EQ.12) THEN
      j = 365
   ELSE
      j = doymon(i+1)-1
   ENDIF
   fe = 1 + 0.033*cos(2.*pi*j/365.)  !the eccentricity factor
                                      !or the relative distance
                                      !between Earth and Sun
   delta = 0.4093*sin(2*pi*j/365.0 - 1.405) !the solar declination
                                      !in radians
     DO k=1,37                         !latitude loop (90S to 90N)
       phi = (-90.0+(k-1)*5.)*pi/180.0       !latitude in radians
       qtot = 0.0
       DO ih=1,1440                     !hour loop (1 to 24)
           t = (ih - 0.5)/60           !the hour of day
           h = pi*(t-12.0)/12.0        !the hour angle in radians
           q = s0*fe*(sin(phi)*sin(delta)+cos(phi)*cos(delta)*cos(h))
           IF (q.LT.0.) q = 0.         !negative means Sun is
                                        !below horizon, set to zero
           qtot = qtot + q             !get daily cumulative
       ENDDO
       qdaily1 (i,k) = qtot / 1440.0 !daily mean
     ENDDO
ENDDO

DO i=1,12                              !Do loop for the first day of each month
   j = doymon(i)                      !Julian day number: 1st day
   fe = 1 + 0.033*cos(2.*pi*j/365.)  !the eccentricity factor
                                      !or the relative distance
                                      !between Earth and Sun
   delta = 0.4093*sin(2*pi*j/365.0 - 1.405)  !the solar declination
                                      !in radians
     DO k=1,37                         !latitude loop (90S to 90N)
       phi = (-90.0+(k-1)*5.)*pi/180.0       !latitude in radians
       qtot = 0.0
       DO ih=1,1440                     !hour loop (1 to 24)
           t = (ih - 0.5)/60           !the hour of day
```

```fortran
            h = pi*(t-12.0)/12.0       !the hour angle in radians
            q = s0*fe*(sin(phi)*sin(delta)+cos(phi)*cos(delta)*cos(h))
            IF (q.LT.0.) q = 0.        !negative means Sun is
                                       !below horizon, set to zero
            qtot = qtot + q            !get daily cumulative
        ENDDO
        qdaily2 (i,k) = qtot / 1440.0 !daily mean
        qdaily(i,k) = (qdaily1(i,k) + qdaily2(i,k))/2.0
      ENDDO
ENDDO

WRITE(100,800) (mon(i),i=1,12)
WRITE(100,900) (-90.0+(k-1)*5.,(int(qdaily(i,k)),i=1,12), k=37,1,-1)
WRITE(100,800) (mon(i),i=1,12)
800     FORMAT(8x,12A6)
900     FORMAT(2x,f4.0,2x,12I6)
STOP
END  PROGRAM hmwk1_4
```