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efem()
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efem()
Prgm
Local typ,axq,ecc,inc,lnode,argp
Local day_,mon_,yr_,jdtmp,jd0
Local obl0,f0,g0,h0,i0,j0,k0
Local aAng,aMag,bAng,bMag,cAng,cMag
Local uu,vv
Local jdc,mm1
Local manD,ean,cr1,nu,rhel
Local pman,bE,bD
Local pC,cDiv,rT,sT,zeta,zz,theta
Local m11,m12,m13,m21,m22,m23,m31,m32,m33
Local jcent,earthMA,earthEcc,earthAx,earthNu,earthR
Local smlon,stLon
Local venusAng,jupAng,marsAng,moonAng,auxAng,auxAng2,corrR,corrL,oblDate
Local eclx,eclz,sx1,sy1,sz1
Local gx,gy,gz,raU,raV,dist,decD
Local raHrs,h1,m1,s1,d2,m2,s2,dsgn
Local again

setMode("Angle","DEGREE")
ClrIO

Disp "EFEMERIDY - TI-92 Plus"
Input "Typ: 1=elipsa,2=perihel q",typ
If typ=1 Then
    Input "Hlavni poloosa a [AU]",axq
    Input "Excentricita e",ecc
Else
    Input "Perihel q [AU]",axq
EndIf
Input "Sklon i [st]",inc
Input "Delka vzest.uzlu Om [st]",lnode
Input "Argument perihelu w [st]",argp

Disp "Datum prochodu perihelem:"
Input "Den",day_
Input "Mesic",mon_
Input "Rok",yr_
If mon_<=2 Then
    yr_-1->yr_
    mon_+12->mon_
EndIf
jdtmp=floor(365.25*yr_)+floor(30.6001*(mon_+1))+day_-679003.5->jdtmp
jdtmp=floor(jdtmp/100)+floor(floor(jdtmp/100)/4)->jdtmp
jdtmp->jd0

23.4457889->obl0
cos(lnode)->f0
sin(lnode)*cos(obl0)->g0
g0*tan(obl0)->h0
-sin(lnode)*cos(inc)->i0
cos(lnode)*cos(obl0)*cos(inc)-sin(inc)*sin(obl0)->j0
cos(lnode)*cos(inc)*sin(obl0)+sin(inc)*cos(obl0)->k0

atan(f0/i0)+90*(1-i0/abs(i0))*(f0/abs(f0))->uu
sqrt(i0^2+f0^2)->vv
uu->aAng
vv->aMag

atan(g0/j0)+90*(1-j0/abs(j0))*(g0/abs(g0))->uu
sqrt(j0^2+g0^2)->vv
uu->bAng
vv->bMag

atan(h0/k0)+90*(1-k0/abs(k0))*(h0/abs(h0))->uu
sqrt(k0^2+h0^2)->vv
uu->cAng
vv->cMag

Loop
ClrIO
Disp "Datum vypoctu polohy:"
Input "Den",day_
Input "Mesic",mon_
Input "Rok",yr_
If mon_<=2 Then
    yr_-1->yr_
    mon_+12->mon_
EndIf
jdtmp=floor(365.25*yr_)+floor(30.6001*(mon_+1))+day_-679003.5->jdtmp
jdtmp=floor(jdtmp/100)+floor(floor(jdtmp/100)/4)->jdtmp
jdtmp->jdc

(jdc-jd0)/(axq*sqrt(axq))->mm1

If typ=1 Then
    mod(.985609*mm1,360)->manD
    manD->ean
    Loop
        (manD+(180*ecc/pi)*sin(ean)-ean)/(1-ecc*cos(ean))->cr1
    EndLoop
EndIf

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        If abs(cr1)<=1E-7 Then
            Exit
        EndIf
        ean+cr1->ean
    EndLoop
    2*atan(sqrt((1+ecc)/(1-ecc))*tan(ean/2))->nu
    axq*(1-ecc*cos(ean))->rhel
Else
    .0364911624*mm1->pman
    0->bE
    Loop
        (2*bE^3+pman)/(bE^2+1)/3->bD
        If abs(bD-bE)<=1E-6 Then
            Exit
        EndIf
        bD->bE
    EndLoop
    2*atan(bE)->nu
    axq*(1+bE^2)->rhel
EndIf

15020->pC
36524.2199->cDiv
(jdc-pC-.313)/cDiv->rT
(33282.423-jdc)/cDiv->sT
(((.018*sT+.302)*sT+2304.25+1.396*rT)*sT)/3600->zeta
(((.42*sT-.426)*sT+2004.682-.853*rT)*sT)/3600->z
((.001*sT+.791)*sT*sT)/3600+zeta->theta

cos(zeta)*cos(theta)*cos(zz)-sin(theta)*sin(zeta)->m11
sin(zeta)*cos(theta)+cos(zeta)*sin(theta)*cos(zz)->m12
cos(zeta)*sin(zz)->m13
-m12->m21
cos(zeta)*cos(theta)-sin(zeta)*sin(theta)*cos(zz)->m22
-sin(zeta)*sin(zz)->m23
-m13->m31
-sin(theta)*sin(zz)->m32
cos(zz)->m33

(jdc-pC)/36525->jcent
((-33E-7*jcent-15E-5)*jcent+35999.04975)*jcent->earthMA
mod(earthMA+358.47583,360)->earthMA

(126E-9*jcent-418E-7)*jcent+.01675104->earthEcc
1+2E-7->earthAx

earthMA->ean
Loop
    (earthMA+(180*earthEcc/pi)*sin(ean)-ean)/(1-earthEcc*cos(ean))->corr
    If abs(corr)<=1E-7 Then
        Exit
    EndIf
    ean+corr->ean
EndLoop
2*atan(sqrt((1+earthEcc)/(1-earthEcc))*tan(ean/2))->earthNu
earthAx*(1-earthEcc*cos(ean))->earthR

(3025E-7*jcent+36000.76892)*jcent+279.69668->smLon
mod(smLon+earthNu-earthMA,360)->stLon

mod(153.23+22518.7541*jcent,360)->venusAng
mod(216.571+45037.5082*jcent,360)->jupAng
mod(312.69+32964.3577*jcent,360)->marsAng
mod((-144E-5*jcent+445267.1142)*jcent+350.74,360)->moonAng

543*sin(venusAng)+1575*sin(jupAng)+1627*sin(marsAng)+3076*cos(moonAng)->corrR
mod(65928.7155*jcent+353.4,360)->auxAng
corrR+927*sin(auxAng)->corrR
earthR+corrR*1E-8->earthR

134*cos(venusAng)+154*cos(jupAng)+200*cos(marsAng)+179*sin(moonAng)->corrL
mod(231.19+20.2*jcent,360)->auxAng2
corrL+178*sin(auxAng2)->corrL
mod(stLon+corrL*1E-5,360)->stLon

((503E-9*jcent-164E-8)*jcent-.0130125)*jcent+23.452294->oblDate

earthR*cos(stLon)->eclx
earthR*sin(stLon)*cos(oblDate)->eclly
earthR*sin(stLon)*sin(oblDate)->eclz

m11*eclx+m21*eclly+m31*eclz->sx1
m12*eclx+m22*eclly+m32*eclz->sy1
m13*eclx+m23*eclly+m33*eclz->sz1

sin(aAng+argp+nu)*aMag*rhel+sx1->gx
sin(bAng+argp+nu)*bMag*rhel+sy1->gy
sin(cAng+argp+nu)*cMag*rhel+sz1->gz

atan(gy/gx)+90*(1-gx/abs(gx))*(gy/abs(gy))->raU
sqrt(gx^2+gy^2)->raV
If raU<0 Then
    raU+360->raU
EndIf

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sqrt(raV^2+gz^2)->dist
asin(gz/dist)->decD

raU/15->raHrs
floor(raHrs)->h1
floor((raHrs-h1)*60)->m1
((raHrs-h1)*60-m1)*60->s1

If decD<0 Then
    -1->dsgn
Else
    1->dsgn
EndIf
abs(decD)->decD
floor(decD)->d2
floor((decD-d2)*60)->m2
((decD-d2)*60-m2)*60->s2

ClrIO

Disp "RA="&string(h1)&"h "&string(m1)&"m "&string(round(s1,1))&"s"
If dsgn<0 Then
    Disp "DEC=-"&string(d2)&"st "&string(m2)&"min "&string(round(s2,1))&"sek"
Else
    Disp "DEC="&string(d2)&"st "&string(m2)&"min "&string(round(s2,1))&"sek"
EndIf
Disp "DIST="&string(round(dist,4))&"AU"

Input "Dalsi datum? 1=ano 0=ne",again
If again=0 Then
    Exit
EndIf
EndLoop

DispHome
EndPrgm

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