

For the TI-83 or TI-83 Plus -- See Next Page for
TI-86 Version

Two more 83 programs for point conversion from/to 3D rectangular, cylindrical and spherical systems are on page 3.

Ask for a download to your calculator.

Program CROSSP 83 by Ron Mower (don't type this line)

```

Cl rHome
Di sp "CROSSP"
Di sp "VER 01/22/01"
Di sp "COMPUTES CROSS, "
Di sp "DOT, MAGNITUDE, "
Di sp "UNIT VECTOR OF"
Di sp "CROSS PRODUCT. "
Fl oat
Del Var T
Cl rLi st Lf, L,, L,,, Lt
{0, 0, 0}úáW
{0, 0, 0}úáV
{0, 0, 0}úáU
Cl rHome
Menu("DATA INPUT", "ENTER", M1, "L• and L, ", M2, "EXIT", E1)
Lbl E1
Return
Lbl M2
L•(1)úáU(1): L•(2)úáU(2): L•(3)úáU(3)
L,(1)úáV(1): L,(2)úáV(2): L,(3)úáV(3)
Goto M3
Lbl M1
Di sp " ENTER U AS LIST"
Di sp " {U1, U2, U3}"
Di sp " WITH BRACKETS: "
Input "U: ", áU
Cl rHome
Di sp ""
Output(1, 1, " VECTOR U")
Di sp áUáFrac
Di sp " ENTER V AS LIST"
Di sp " {V1, V2, V3}"
Di sp " WITH BRACKETS: "
Input "V: ", áV
Lbl M3
Cl rLi st L•, L,
áU(2)*áV(3)-áU(3)*áV(2)úáW(1)
ú(áU(1)*áV(3)-áU(3)*áV(1))úáW(2)
áU(1)*áV(2)-áU(2)*áV(1)úáW(3)
Cl rHome
Di sp áUáFrac
Di sp áVáFrac
Di sp " CROSS MAG UNIT"
Di sp áWáFrac
(áW(1)^2+áW(2)^2+áW(3)^2)^(1/2)úT
Di sp TáFrac
I f T=0
Then
Di sp {0, 0, 0}
Goto 91
End
Fix 2
Di sp áW/TáFrac
Lbl 91
Fl oat
prgmPGETKEY
Cl rHome
Di sp " DOT PRODUCT"
áU(1)*áV(1)+áU(2)*áV(2)+áU(3)*áV(3)úLt(1)
Di sp Lt(1)áFrac
Di sp " THETA DEGREES"
Degree
cosñ(abs(Lt(1))/(ð(áU(1)^2+áU(2)^2+áU(3)^2)ð(áV(1)^2+áV(2)^2+áV(3)^2)))úLt(2)
Lt(2)úX
Di sp Lt(2)áFrac
prgmPGETKEY
Cl rHome
Di sp "U: L•": áUúL•
Di sp "V: L, UNIT: L,,": áVúL,
Di sp "W: Lf MAG: L...(1)": áWúLf
I f T=0
Then
{0, 0, 0}úL,,
Goto 92
End
áW/TúL,,
Lbl 92
Di sp " DOT: Lt(1)"
Di sp " X THETA: Lt(2)"
TúL...(1)
Del Var T
Del Var áW
Del Var áV
Del Var áU
Di sp "STAT EDIT TO SEE"
-----

```

Calculates the cross product

$w = u \times v$,
the magnitude
 $T = |u \times v|$ (T for temp var),
the unit vector
 n
in the same direction as
 $u \times v$
the dot product
 $u \cdot v$
the angle between the vectors
Results are stored in lists
L1 – L6 (and displayed on the
screen).
UúL•
VúL,
WúLf
NúL,,
TúL...(1)
Dot Productú Lt(1)
Theta ú Lt(2) and X

TI-86 Version

```

Program CROSSP 86 by Ron Mower (don't type this line)
:CLCD
:Disp "Cross Product"
:Disp "Ver 01/22/01"
:Float
:Del Var(T)
:Del Var(w)
:Del Var(v)
:Del Var(uu)
:3üdi mL uu
:3üdi mL v
:3üdi mL w
:3üdi mL L1
:3üdi mL L2
:3üdi mL L3
:3üdi mL L4
:1üdi mL L5
:SetLEdi t L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, w, v, uu
:CLCD
:Disp "Enter u as a list"
:Disp " {u1, u2, u3}"
:Disp " with brackets"
:Outpt(6, 1, "Use 2nd LIST for brackets")
:Input "u: ", uu
:CLCD
:Disp ""
:Outpt(1, 1, " Vector u")
:Disp uuâFrac
:Disp "Enter v as a list"
:Disp " {v1, v2, v3}"
:Disp " with brackets"
:Input "v: ", v
:uu(2)*v(3)-uu(3)*v(2)üw(1)
:ú(uu(1)*v(3)-uu(3)*v(1))üw(2)
:uu(1)*v(2)-uu(2)*v(1)üw(3)
:CLCD
:Disp uuâFrac
:Disp vâFrac
:Disp wâFrac
:(w(1)^2+w(2)^2+w(3)^2)^(1/2)üt
:Disp TäFrac
:Fix 2
:If T=0
:Then
:Disp 0
:Goto c1
:End
:Disp w/TâFrac
:Lbl c1
:Float
:uu(1)*v(1)+uu(2)*v(2)+uu(3)*v(3)üL5(2)
:Disp L5(2)âFrac
:Outpt(6, 1, "Dot")
:Outpt(3, 1, "Cross")
:Outpt(4, 1, "Mag")
:Outpt(5, 1, "Unit")
:Outpt(1, 1, "u")
:Outpt(2, 1, "v")
:Pause " Press ENTER"
:CLCD
:Disp "u in L1": uuüL1
:Disp "v in L2": vüL2
:Disp "w in L3": wüL3
:If T=0
:Then
:{0, 0, 0}üL4
:Goto c2
:End
:w/TüL4
:Lbl c2
:Disp "n in L4"
:Disp "Mag L5(1) Dot L5(2)": TüL5(1)
:Del Var(T)
:Del Var(w)
:Del Var(v)
:Del Var(uu)
:Disp "Use LIST Edit to see."
:

```

Note: Vector facilities are available on the TI-86. However, this program was converted from a TI-83 program that does not currently have an equivalent capability. So vector functions were not used in the program.

Calculates the cross product

$w = \mathbf{u} \times \mathbf{v}$,
the magnitude
 $T = |\mathbf{u} \times \mathbf{v}|$ (T for temp var),
the unit vector
 \mathbf{n}
in the same direction as
 $\mathbf{u} \times \mathbf{v}$
and the dot product
 $\mathbf{u} \cdot \mathbf{v}$
Results are stored in lists
L1 – L6 (and displayed on the
screen).
UüL•
VüL,
WüLf
NüL,
TüL...(1)
Dot Productü L...(2)

POINT CONVERSION FORMULAS FOR REFERENCE

```

Cl rHome
Di sp "CFORM"
Di sp "VER 01/27/01"
Di sp "POINT CONVERSION"
Di sp "FORMULA"
Di sp "REFERENCE"
Cl rHome
"CR: X=rCOST, Y=rSINT, Z=Z"úStr5
"RC: rÜ=XÜ+YÜ, TANT=Y/X, Z=Z"úStr6
"SR: X=pSINPCOST, Y=pSINPSINT, Z=pCOSP, ð(XÜ+YÜ)=pSINP"ú
Str7
"RS: pÜ=XÜ+YÜ+ZÜ, TANT=Y/X, P=cosñ(Z/ð(XÜ+YÜ+ZÜ))"úStr8
"SC: rÜ=pÜSINÜP, T=T, Z=pCOSP"úStr9
"CS: p=ð(rÜ+ZÜ), T=T, P=cosñ(Z/(rÜ+ZÜ))"úStr0

Di sp "CR: Str5"
Di sp "RC: Str6"
Di sp "SR: Str7"
Di sp "RS: Str8"
Di sp "SC: Str9"
Di sp "CS: Str0"

```

POINT CONVERSION PROGRAM

```

Cl rHome
Di sp "CONV"
Di sp "VER 01/26/01"
Di sp "INPUT IN L,"
Di sp "OUTPUT L..., L†"
Di sp "CONVERTS POINTS FROM/TO"
Di sp "RECTANGULAR, RECTANGULAR, "
Di sp "SPHERICAL (IN 3D) USING"
Di sp "RADIANS OR DEGREES"
Cl rHome

Menu("MODE?", "DEGREE", D2, "RADI AN", D1, "QUI T", M3)
Lbl M3: 4ÜS: Goto Q9

Lbl D1: Radi an: Di sp "RADI AN": Del Var R: 1ÜR: Goto M1
Lbl D2: Degree: Di sp "DEGREE": Del Var R: 0ÜR: Goto M1

Lbl M1
Del Var S
Menu("Input
TYPE?", "RECTANGULAR", R1, "CYLI NDRI CAL", C1, "SPHERI CAL"
, S1, "QUI T", M3)
Lbl M2

Lbl R1: 1ÜS: Di sp "RECTANGULR Input": Goto L1
Lbl C1: 2ÜS: Di sp "CYLI NDRI CL Input": Goto L1
Lbl S1: 3ÜS: Di sp "SPHERI CAL Input": Goto L1

Lbl L1
Float: a+bà
Cl rLi st L..., L†, L,, Lf
{0, 0, 0}úLf
{0, 0, 0}úL†
{0, 0, 0}úL...
{0, 0, 0}úL,
Di sp "ENTER POINT AS"
Di sp "LI ST {A, B, C}"
Input "": ", L,
If L,(1)=0 and L,(2)=0 and L,(3)=0
Then
Di sp "ALL (0, 0, 0)"
Return
End
Cl rHome

If S=1: Then: Goto R2: End: "RECTANGLUAR IN"
If S=2: Then: Goto C2: End: "CYLI NDRI CAL IN"
If S=3: Then: Goto S2: End: "SPHERI CAL IN"

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Lbl R2
If L,(1)=0 and L,(2)=0
Then
OüL...(1): OüL...(2)
OüL†(1): OüL†(2)
Goto R5
End
ð(L,(1)Ü+L,(2)Ü)üL...(1)
If L,(1)=0 and R=1
Then
If L,(2)>0
Then
Ä/2üL...(2): Ä/2üL†(2)
Else
üÄ/2üL...(2): üÄ/2üL†(2)
End
Goto R5
End
If L,(1)=0 and R=0
Then
If L,(2)>0
Then
90üL...(2): 90üL†(2)
Else
ü90üL...(2): ü90üL†(2)
End
Goto R5
End
tanñ(L,(2)/L,(1))üL...(2)
tanñ(L,(2)/L,(1))üL†(2)
Lbl R5
L,(3)üL...(3)
ð(L,(1)Ü+L,(2)Ü+L,(3)Ü)üL†(1)
cosñ(L,(3)/ð(L,(1)Ü+L,(2)Ü+L,(3)Ü))üL†(3)
Goto Q9

Lbl C2
If L,(1)=0 and L,(3)=0
Then
Di sp L,
Di sp "A AND C CANNOT"
Di sp "BOTH BE ZERO"
Goto Q7
End

If L,(1)<0
Then
üL,(1)üL,(1)
Di sp "* WARNING R<0 * "
Di sp " LETTI NG R=-R "
Di sp " and "
If R=0
Then

If L,(2)-180<0
Then
L,(2)+180üL,(2)
Di sp "THETA=THETA+180"
Else
L,(2)-180üL,(2)
Di sp "THETA=THETA-180"
End
Else
If L,(2)-Ä<0
Then
L,(2)+ÄüL,(2)
Di sp "THETA=THETA+Ä "
Else
L,(2)-ÄüL,(2)
Di sp "THETA=THETA-Ä "
End
End
Del Var K
OÜK
Output(8, 1, " ANY KEY. . . ")
While K=0
getKeyüK
End

```

```

ClrHome
End
Ln(1)cos(Ln(2))üL... (1)
Ln(1)sin(Ln(2))üL... (2)
Ln(3)üL... (3)
ö(Ln(1)Ü+Ln(3)Ü)üL†(1)
Ln(2)üL†(2)
cosñ(Ln(3)/ö(Ln(1)Ü+Ln(3)Ü))üL†(3)
Goto Q9

```

```

Lbl S2
Ln(1)sin(Ln(3))cos(Ln(2))üL... (1)
Ln(1)sin(Ln(3))sin(Ln(2))üL... (2)
Ln(1)cos(Ln(3))üL... (3)
ö((Ln(1)sin(Ln(3)))Ü)üL†(1)
Ln(2)üL†(2)
Ln(1)cos(Ln(3))üL†(3)
Goto Q9

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Lbl Q9

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If S=4
Then
ClrHome
Di sp " ABORTED BY USER"
Return
End

```

```

Fix 2

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If S=1
Then
Di sp "RECTANGULR Input"
Di sp Ln
Di sp " CYLI NDRI CAL"
Di sp L...
Di sp " SPHERI CAL"
Di sp L†
Goto Q8
End

```

```

If S=2
Then
L...üLf: LnüL...: LfüLn
Di sp " RECTANGULAR"
Di sp Ln
Di sp "CYLI NDRI CL Input"
Di sp L...
Di sp " SPHERI CAL"
Di sp L†
Goto Q8
End

```

```

If S=3
Then
L...üLf: L†üL...: LnüL†: LfüLn
Di sp " RECTANGULAR"
Di sp Ln
Di sp " CYLI NDRI CAL"
Di sp L...
Di sp " SPHERI CAL Input"
Di sp L†
Goto Q8
End

```

```

Lbl Q8
If R=0
Then
Di sp " DEGREES"
End
If R=1
Then
Di sp " RADI ANS"
End
Del Var K
Oük
Output(8,1," ANY KEY... ")
While K=0
getKeyüK
End
ClrHome

```

```

If S=1
Then
Di sp "RECTANG Input Ln"
Di sp "CYLI NDRI CAL L..."
Di sp "SPHERI CAL L†"
End
If S=2
Then
Di sp "RECTANGULAR Ln"
Di sp "CYLI NDR Input L..."
Di sp "SPHERI CAL L†"
End
If S=3
Then
Di sp "RECTANGULAR Ln"
Di sp "CYLI NDRI CAL L..."
Di sp "SPHERI C Input L†"
End
If R=0
Then
Di sp "DEGREES"
End
If R=1
Then
Di sp "RADI ANS"
End
Di sp "USE STAT EDIT"
Di sp "TO SEE... "
Del Var K
Lbl Q7
Del Var S
Del Var R
ClrLi st Lf
Float

```
