

# CALC2

Der: derivative (0.6s) Int: integral (3s)  Dern: n.th (anti-) derivative (1.5s, 3,2s)	<pre> 6:      COS(X*Y)^2 5:      'X' 4:      -(2*Y*COS(Y*X)*SIN(Y*X)) 3:      COS(X*Y)^2 2:      'Y' 1:      SIN(2*Y*X)+2*Y*X           4*X SPCO CYCO Der Int Dern Der.u </pre>	<pre> 8:      COS(X*Y)^2 7:      'X' 6:      'X' 5:      2*Y^2*SIN(Y*X)^2-2*Y^2*COS(Y*X)^2 4:      'X' 3:      'Y' 2:      'Y' 1:      SIN(2*Y*X)+2*Y*X           4*X SPCO CYCO Der Int Dern Der.u </pre>
Der.u: directional derivative (0.5s)  Fval: function value (0.5s)	<pre> RAD XYZ DEC R= 'X' CHOME CALC23  USR 5: 4:      X^2+Y^2           2 3:      C1 I1 2:      C2 Y1 1:      Y+X           2 SPCO CYCO Der Int Dern Der.u </pre>	<pre> 9: 8: 7: 6:      ATAN(X/Y) 5:      {sqrt(2) 1/7} 4:      .1993472077 3:      ATAN(X/Y) 2:      5 1:      ATAN(5./Y) Dlhn Intab Fval Vtab XYtab XYZtab </pre>
XYtable: table of values (2s)  result (2s)	<pre> 9: 8: 7: 6: 5: 4: 3:      SIN(X*Y) 2:      {1 2 3} 1:      {4 5} Dlhn Intab Fval Vtab XYtab XYZtab </pre>	<pre> 9: 8: 7: 6: 5: 4: 3:      { 2:      (1,4):(-.756202495302) 1:      (1,5):(-.958924274663)         (2,4):.929358246623         (2,5):(-.544021110829)         (3,4):(-.536572918)         (3,5):.650287840157         } Dlhn Intab Fval Vtab XYtab XYZtab </pre>
XYZtable: table of values (2s)  result	<pre> 9: 8: 7: 6: 5: 4:      SIN(X*Y*Z) 3:      {1 2} 2:      {3 4} 1:      {5 6} Dlhn Intab Fval Vtab XYtab XYZtab </pre>	<pre> 9: 8: 7: 6: 5: 4: 3:      { 2:      (1,3,5):.650287840157 1:      (1,4,5):.912945250728         (2,3,5):(-.982031624093)         (2,4,5):.745113160479         (1,3,6):(-.750387246772)         (1,4,6):(-.905572362007)         (2,3,6):(-.991772853443)         (2,4,6):(-.768254661324)         } Dlhn Intab Fval Vtab XYtab XYZtab </pre>
Tayl2: Taylor series around X0 Y0 Z0 up to n=2 (7s)  Dtot: total derivative	<pre> RAD XYZ DEC R= 'X' CHOME CALC23  USR 7: 6: 5:      'COS(X*Y*Z)' 4:      'pi/2' 3:      1 2:      0 1:      '1-1/2*(pi^2/4*Z^2)' ECHO VIEW EDIT PICK ROLL ROLLO </pre>	<pre> 9: 8: 7: 6: 5: 4: 3: 2:      X^3*Y-X*Y^3 1:      (3*Y*X^2-Y^2)*dX+(X^2-3*Y^2)*dY F3DE3 FAST3 Tayl2 Dtot Hess Grad </pre>
Grad, Div, Curl, Lapl: of scalar or vector (0.5s)  Hess: Hessian (s)	<pre> 8:      SIN(X*Y) 7:      [Y*COS(Y*X) X*COS(Y*X) 0] 6:      [X*Y Y*Z Z*X] 5:      X+Y+Z 4:      [X*Y Y*Z Z*X] 3:      [-Y -Z -X] 2:      SIN(X*Y) 1:      -((X^2+Y^2)*SIN(Y*X)) DlV Curl Lapl Poten Vpot Lint1 </pre>	<pre> 9: 8: 7: 6: 5: 4: 3: 2:      X^3*Y^2*Z 1:      [         6*2*Y^2*X 6*2*Y*X^2 3*Y^2*X^2         6*2*Y*X^2 2*2*X^3 2*Y*X^3         3*Y^2*X^2 2*Y*X^3 0       ] F3DE3 FAST3 Tayl2 Dtot Hess Grad </pre>
Lint1: line integral 1. kind $\int f(X(T),Y(T))\sqrt{(X'^2+Y'^2)}dT$ (9s)  Lint2: line integral 2. kind $\int (f_x dX + f_y dY)$ (3s)	<pre> RAD XYZ DEC R= 'X' CHOME CALC23  USR 6: 5:      'Y' 4:      {R*COS(T) R*SIN(T)} 3:      0 2:      pi 1:      2*R DlV Curl Lapl Poten Vpot Lint1 </pre>	<pre> RAD XYZ DEC R= 'X' CHOME CALC23  USR 5:      (X*Y Y-X) 4:      {         (T T^2)         } 3:      0 2:      1 1:      1/2 Lint2 Hint Jacob Dtrf CST IERR </pre>
Jacobian: of cylindrical coordinates (0.8s)  Jacobian of spherical coordinates (4,2s)	<pre> 9: 8: 7: 6: 5: 4:      [r*COS(alpha) r*SIN(alpha) z] 3:      [r alpha z] 2:      'r' 1:      'r' Lint2 Hint Jacob Dtrf CST IERR </pre>	<pre> 9: 8: 7: 6: 5: 4:      [         r*COS(alpha)*SIN(alpha)         r*SIN(alpha)*SIN(alpha)         r*COS(alpha)       ] 3: 2:      [         r         alpha         z       ] 1:      r^2*SIN(alpha) Lint2 Hint Jacob Dtrf CST IERR </pre>

SPCO: → $r\theta\alpha$ : cartesian to spherical coordinates (1s)  S→XYZ: spherical to cartesian coordinates (2.6s)	RAD XYZ DEC R= 'X' \OME CALC2 SPC03 USR 6: 5: 4: 3: 2: 1: + $\theta\alpha$   S-WVZ   Derr   Der0   Der $\alpha$   Intr $\begin{aligned} & r \cos(\theta) \\ & r \sin(\theta) \cos(\alpha) \\ & r \sin(\theta) \sin(\alpha) \end{aligned}$	RAD XYZ DEC R= 'X' \OME CALC2 SPC03 USR 6: 5: 4: 3: 2: 1: + $\theta\alpha$   S-WVZ   Derr   Der0   Der $\alpha$   Intr $\begin{aligned} & \sqrt{x^2+y^2+z^2} \cdot \text{ATAN}\left(\frac{\sqrt{x^2+y^2}}{z}\right) \\ & \frac{r \cdot \theta}{2} \end{aligned}$
SPCO: Sgrad,div,curl: grad, div, curl in spherical coordinates (1s)  Slapl: Laplacian in spherical coordinates (0.4s)	RAD XYZ DEC R= 'X' \OME CALC2 SPC03 USR 6: 5: 4: 3: 2: 1: Int0   Int $\alpha$   Sgrad   Sdiv   Scurl   Slapl $\begin{aligned} & \frac{1}{r^2} \sin(\theta) \left( \frac{\partial}{\partial r} + \frac{1}{r} \frac{\partial}{\partial \theta} + \frac{1}{r \sin(\theta)} \frac{\partial}{\partial \alpha} \right) \\ & \frac{1}{r^2} \sin(\theta) \left( \frac{\partial}{\partial r} + \frac{1}{r} \frac{\partial}{\partial \theta} + \frac{1}{r \sin(\theta)} \frac{\partial}{\partial \alpha} \right) \end{aligned}$	RAD XYZ DEC R= 'X' \OME CALC2 SPC03 USR 6: 5: 4: 3: 2: 1: Int0   Int $\alpha$   Sgrad   Sdiv   Scurl   Slapl $\begin{aligned} & \frac{1}{r^2} \sin(\theta) \left( \frac{\partial}{\partial r} + \frac{1}{r} \frac{\partial}{\partial \theta} + \frac{1}{r \sin(\theta)} \frac{\partial}{\partial \alpha} \right) \\ & \frac{1}{r^2} \sin(\theta) \left( \frac{\partial}{\partial r} + \frac{1}{r} \frac{\partial}{\partial \theta} + \frac{1}{r \sin(\theta)} \frac{\partial}{\partial \alpha} \right) \end{aligned}$
CYCO: → $\rho\alpha z$ : cartesian to cylindrical coordinates (0.7s)  C→XYZ: cylindrical to cartesian coordinates (1s)	RAD XYZ DEC R= 'X' \OME CALC2 CYC03 USR 6: 5: 4: 3: 2: 1: + $\rho\alpha z$   C-WVZ   DerP   Der $\alpha$   Derz   IntP $\begin{aligned} & \sqrt{x^2+y^2} \cdot z \\ & \sqrt{x^2+y^2} \cdot \tan(\alpha) \end{aligned}$	RAD XYZ DEC R= 'X' \OME CALC2 CYC03 USR 6: 5: 4: 3: 2: 1: + $\rho\alpha z$   C-WVZ   DerP   Der $\alpha$   Derz   IntP $\begin{aligned} & \sqrt{x^2+y^2} \cdot \tan(\alpha) \\ & \sqrt{x^2+y^2} \cdot \tan(\alpha) \end{aligned}$
CYCO: Cgrad,div,curl: grad, div, curl in cyl. coordinates (1s)  Clapl: Laplacian in cyl. coordinates (0.4s)	RAD XYZ DEC R= 'X' \OME CALC2 CYC03 USR 6: 5: 4: 3: 2: 1: Int0   Intz   Cgrad   Cdiv   Ccurl   Clapl $\begin{aligned} & \frac{1}{\rho} \left( \frac{\partial}{\partial \rho} + \frac{1}{\rho} \frac{\partial}{\partial \alpha} + \frac{\partial}{\partial z} \right) \\ & \frac{1}{\rho} \left( \frac{\partial}{\partial \rho} + \frac{1}{\rho} \frac{\partial}{\partial \alpha} + \frac{\partial}{\partial z} \right) \end{aligned}$	RAD XYZ DEC R= 'X' \OME CALC2 CYC03 USR 6: 5: 4: 3: 2: 1: Int0   Intz   Cgrad   Cdiv   Ccurl   Clapl $\begin{aligned} & \frac{1}{\rho} \left( \frac{\partial}{\partial \rho} + \frac{1}{\rho} \frac{\partial}{\partial \alpha} + \frac{\partial}{\partial z} \right) \\ & \frac{1}{\rho} \left( \frac{\partial}{\partial \rho} + \frac{1}{\rho} \frac{\partial}{\partial \alpha} + \frac{\partial}{\partial z} \right) \end{aligned}$
HelpCALC2: help	CALC2: CALCULUS FOR FUNCTIONS OF VARIABLES X,Y,Z  SPCO: SPHER. COORD. $\theta \alpha r$ CYCO: CYL. COORD. $\rho \alpha z$ Der F V + $\partial V(F)$ DERIV,EXPAND Int F V + $\int \partial V(F)$ INT.,EXPAND Der $\alpha$ F n V + $\partial V(F)$ (n>0) Der $\alpha$ F n V + $\partial V(F)$ (n<0) Der.u F u (V) + $\partial V(F)$ .u directional derivative GRAPH OK	D(hn F (h n + D(RDHYDZ(F) (h,n) >, < 0 Intab F a b V + $\int(a,b,F,V)$ Fual F(X,Y,Z) <X0 Y0 Z0> + F0 Vtable F (X1..XN3(a b s) V + C3 TABLE OF FCT. VALUES OF (X1..Z OR a TO b STEP s V = X,Y,Z VARIABLE XYtable F(X,Y) (X1..XN3 (Y1..YN3) + (F1..F3) XYZtable F(X,Y,Z) (X1..XN3 (Y1..YN3) (Z1..ZN3) + (F1..F3) GRAPH OK
HelpCALC2: help	F3DEX example fast 3D plot FAST3DP '...' plot Tayl2 F X0 Y0 Z0 + 5 TAYLORSER. Dtot F+ $\partial F$ dX+ $\partial F$ dY+ $\partial F$ dZ Grad F(X,Y,Z) + grad(F) Div (F) + DIV(F) Curl (F) + CURL(F) Lapl F + $\Delta(F)$ LAPLACIAN Potential (F) + POTENTIAL exists if DIV(F)=0 Vpotential (F) + G VECTOR POT. exists if CURL(F)=0 GRAPH OK	exists if CURL(F)=0 Lint1 F (X(T))..3 T1 T2 + I LINEINTEGRAL 1.KIND Lint2 F (X(T))..3 T1 T2 + I LINEINTEGRAL 2.KIND Mint F (a1 b1..3 (X1..XN3 + I MULTIPLE INTEGRALS Jacobian (X1(X)..XN(X))>>(X1..XN3 + J JACOBI DETERMINANT Dtrf F(X(X))..3 X1=X1(X)..3 (X1=X1(X)..3 + G(X(X)) DIFF. TRANSFORMATIONS GRAPH OK