

VARIATION

Example: Lagrangian examples	<pre> RAD WYZ DEC R= '0' CHOM 7: 6: 5: 4: 3: 2: 1: </pre> <div> <p>Example Lagrangians</p> <pre> '1/2*(d1r^2+w^2*r^2)' '1/2*(d1r^2+r^2*d1w^2)' 'd1u^2-d2u^2' '3t(u(t,x))^2-3x(u(t,x)' '1/2*d1p^2-h^2/2*p^2-g' 'd1p*d1pb-d2p*d2pb-h^2' 'pb*x*y0*d1p+pb*x*y1*d </pre> </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{h}{2} \cdot (d1r^2 + w^2 \cdot r^2)$ $r(t)$ $d1u^2 - d2u^2$ $u(t,x)$ $\frac{1}{2} \cdot d1p^2 - \frac{h^2}{2} \cdot p^2 - \frac{g}{4!} \cdot p^4$ $p(x)$ </div>
Eleg: calculates Euler Lagrange equation (4s)	<pre> 3: 2: 1: </pre> <div> $\frac{h}{2} \cdot (d1r^2 + w^2 \cdot r^2)$ $r(t)$ $h \cdot d1d1r(t) - w^2 \cdot r(t) \cdot h = 0$ $d1u^2 - d2u^2$ $u(t,x)$ $2 \cdot d1d1u(t,x) - 2 \cdot d2d2u(t,x) = 0$ </div>	<pre> 3: 2: 1: </pre> <div> $\frac{1}{2} \cdot d1p^2 - \frac{h^2}{2} \cdot p^2 - \frac{g}{4!} \cdot p^4$ $p(x)$ $h^2 \cdot p(x) + \frac{3 \cdot p(x)^3}{6} + d1d1p(x) = 0$ </div>
Eleg: Euler Lagrange equation (9s)	<pre> 6: 5: 4: 3: 2: 1: </pre> <div> $d1p \cdot d1pb - d2p \cdot d2pb - h^2 \cdot p \cdot pb$ $\left\{ \begin{array}{l} p(t,x) \\ pb(t,x) \end{array} \right\}$ $\left\{ \begin{array}{l} d1d1pb(t,x) - d2d2pb(t,x) + h^2 \cdot pb(t,x) \\ d1d1p(t,x) - d2d2p(t,x) + p(t,x) \end{array} \right\}$ </div>	<pre> RAD WYZ DEC R= '0' CHOME VARIATION3 USR 7: 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{\partial}{\partial t} (u(t,x))^2 - \frac{\partial}{\partial x} (u(t,x))^2$ $u(t,x)$ $2 \cdot u(t,x) \cdot d1u(t,x) - d2u(t,x)$ </div>
Noether: Noether current from Lagrangian (3s)	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{h}{2} \cdot (d1r^2 + w^2 \cdot r^2)$ $r(t)$ $d1r(t) \cdot r(t) \cdot h$ $\frac{1}{2} \cdot d1p^2 - \frac{h^2}{2} \cdot p^2 - \frac{g}{4!} \cdot p^4$ $p(x)$ $d1p(x) \cdot p(x)$ </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $d1p \cdot d1pb - d2p \cdot d2pb - h^2 \cdot p \cdot pb$ $\left\{ \begin{array}{l} p(t,x) \\ pb(t,x) \end{array} \right\}$ $-(d2p(t,x) - d1p(t,x)) \cdot p(t,x) + p(t,x) \cdot d1p(t,x)$ </div>
Noether: Noether current from Lagrangian (3s)	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{h}{2} \cdot (d1r^2 + w^2 \cdot r^2)$ $r(t)$ $d1r(t) \cdot r(t) \cdot h$ $\frac{1}{2} \cdot d1p^2 - \frac{h^2}{2} \cdot p^2 - \frac{g}{4!} \cdot p^4$ $p(x)$ $d1p(x) \cdot p(x)$ </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $d1p \cdot d1pb - d2p \cdot d2pb - h^2 \cdot p \cdot pb$ $\left\{ \begin{array}{l} p(t,x) \\ pb(t,x) \end{array} \right\}$ $-(d2p(t,x) - d1p(t,x)) \cdot p(t,x) + p(t,x) \cdot d1p(t,x)$ </div>
(6s)	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{h}{2} \cdot (d1r^2 + w^2 \cdot r^2)$ $r(t)$ $d1r(t) \cdot r(t) \cdot h$ $\frac{1}{2} \cdot d1p^2 - \frac{h^2}{2} \cdot p^2 - \frac{g}{4!} \cdot p^4$ $p(x)$ $d1p(x) \cdot p(x)$ </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $d1p \cdot d1pb - d2p \cdot d2pb - h^2 \cdot p \cdot pb$ $\left\{ \begin{array}{l} p(t,x) \\ pb(t,x) \end{array} \right\}$ $-(d2p(t,x) - d1p(t,x)) \cdot p(t,x) + p(t,x) \cdot d1p(t,x)$ </div>
Hamiltonian after FDISTRIB (4s)	<pre> 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{1}{2} \cdot d1p^2 - \frac{h^2}{2} \cdot p^2 - \frac{g}{4!} \cdot p^4$ $p(x)$ $\frac{h^2 \cdot p(x)^2}{2} + \frac{3 \cdot p(x)^4}{24} + \frac{d1p(x)^2}{2}$ </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{h}{2} \cdot (d1r^2 + w^2 \cdot r^2)$ $r(t)$ $\frac{w^2 \cdot h \cdot r(t)^2}{2} + \frac{h \cdot d1r(t)^2}{2}$ </div>
Delvar: delete independent variables (1s)	<pre> 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{\partial}{\partial t} (u(t,x))^2 - \frac{\partial}{\partial x} (u(t,x))^2$ $u(t,x)$ $-(d2u^2 - d1u^2)$ </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $-(d2u^2 - d1u^2)$ $u(t,x)$ $-(d2u(t,x)^2 - d1u(t,x)^2)$ </div>
Insvar: insert independent variables (1s)	<pre> 6: 5: 4: 3: 2: 1: </pre> <div> $\frac{\partial}{\partial t} (u(t,x))^2 - \frac{\partial}{\partial x} (u(t,x))^2$ $u(t,x)$ $-(d2u^2 - d1u^2)$ </div>	<pre> 7: 6: 5: 4: 3: 2: 1: </pre> <div> $-(d2u^2 - d1u^2)$ $u(t,x)$ $-(d2u(t,x)^2 - d1u(t,x)^2)$ </div>
Help VARIATION: help	<pre> Calculus of Variations Examples - L u(x1...), u1... CHOOSEBOX WITH EXAMPLE LAGRANGIANS L u(x1...), 3=FUNCTIONS x1...=INDEP VARIABLES Eleg L u1... + EL EL=EULER LAGRANGE EQNS Noether L u1... + J INTRINSIC NOETHER CURRENT Hamiltonian L u1... + H GRAPH </pre>	<pre> Hamiltonian L u1... + H HAMILTONIAN 1 VARIABLE = TIME Delvar F(u(x,y)) - u(x,y) + F(u) DELETE INDEP VARIABLES Insvar F(u) - u(x,y) + F(u(x,y)) INSERT INDEP VARIABLES + LDEQ u(t) EXAMPLE LINEAR DIFFEQ Ldsolve LDEQ u(t) + ... Ysol SOLUTION OF LINEAR DIFFEQ OF 1 VARIABLE GRAPH </pre>