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! Illustrating numerical integration in LINGO (IntegralDefinite);
! Keywords: @INTEGRAL, Definite integral, Integration, LINGO, Numerical integration;

! Here we input some data to be used anywhere in a LINGO model;
DATA:
    a0 = 5;
    a1 = 12;
    a2 = 3;
    a3 = 2;
    x1 = 1;
    xu = 4;
ENDDATA

! A procedure is a set of code we can call anywhere
in a CALC section;
PROCEDURE PolyOf:
    y = a0 + a1*x + a2*x^2 + a3*x^3;
ENDPROCEDURE

PROCEDURE SINXSQ:
    y = @SIN( X^2);
ENDPROCEDURE

CALC:
! Compute the integral over x1 <= x <= xu,
where the value of y as a function of x is given by the procedure PolyOf;
@SET('TERSEO',2); ! Set default output level to super terse;
@WRITE( @NEWLINE( 1));
yint = @INTEGRAL( PolyOf, x, x1, xu, y);
@WRITE(' The integral of ',a0,' + ',a1,'*x + ',a2,'*x^2 + ',a3,'*x^3',@NEWLINE(1));
@WRITE('over the interval ',x1,' <= x <= ',xu,', is ', yint, @NEWLINE(1));

@WRITE( @NEWLINE( 1));
yint = @INTEGRAL( SINXSQ, x, x1, xu, y);
@WRITE(' The integral of SIN( X^2)',@NEWLINE(1));
@WRITE('over the interval ',x1,' <= x <= ',xu,', is ', yint, @NEWLINE(1));
ENDCALC

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