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Using Maple to solve nonlinear problems

Below is the brief description of codes:

Calling Sequence

NLPSolve(**obj**, **constr**, **bd**, **opts**)

NLPSolve(**opfobj**, **ineqcon**, **eqcon**, **opfbd**, **opts**)

Parameters

obj - **algebraic**; objective function

constr - (optional) **set(relation)** or **list(relation)**; constraints

bd - (optional) sequence of **name = range**; bounds for one or more variables

opfobj - **procedure**; objective function

ineqcon - (optional) **set(procedure)** or **list(procedure)**; inequality constraints

eqcon - (optional) **set(procedure)** or **list(procedure)**; equality constraints

opfbd - (optional) sequence of ranges; bounds for all variables

opts - (optional) equation(s) of the form **option = value** where **option** is one of **assume**, **feasibilitytolerance**, **infinitebound**, **initialpoint**, **iterationlimit**, **maximize**, **method**, **optimalitytolerance**, or **output**; specify options for the **NLPSolve** command

Now let's look at an example.

Maximize $f(x) = \ln(x_1 + 1) + x_2$,
subject to $2x_1 + x_2 \leq 3$
and $x_1 \geq 0,\ x_2 \geq 0$

```
with(Optimization):
CS:={2*x[1]+x[2]<=3};
z:=ln(x[1]+1)+x[2];
NLPSolve(CS, z, assume=nonnegative, maximize);
```

And when you type the codes above, MAPLE will return you the optimal answer:

```
> with(Optimization):
> CS := {2·x[1] + x[2] ≤ 3};
```

$$CS := \{2\ x_1 + x_2 \le 3\}$$

```
> z := ln(x[1] + 1) + x[2];
```

$$z := \ln(x_1 + 1) + x_2$$

```
> NLPSolve(z, CS, assume = nonnegative, maximize);
```

$$[3., [x_1 = 0., x_2 = 3.]]$$

```
>
```