Sequence 1 : Introduction to mathematical programming using GAMS

Unit 1.3. Primal problem, dual problem

Lesson 10 : Loosening a constraint

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ModelEco

Hiring ?

Maximize $Z = 450X_1 + 1000X_2$

With $X_1 + X_2 \leq 50$

$25X_1 + 50X_2 \leq 2000$

$X_1, X_2 \geq 0$

X_3 : number of hours of hired labour

Hired worker :
15€/hour

Hiring ?

How many hours ?

Extract from the GAMS solution

```
Objective :        40000.000000

                            LOWER      LEVEL      UPPER     MARGINAL

---- EQU OBJECTIVE           .          .          .         -1.000
---- EQU LAND              -INF       40.000     50.000        .
---- EQU LABOUR            -INF     2000.000   2000.000      20.000

  OBJECTIVE  objective function
  LAND  land equation
  LABOUR  labour equation
```

Binding value

Modify the initial model to add hired labour

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Writing the new model

Algebraic writing

Maximize $Z = 450X_1 + 1000X_2 - 15X_3$

Subject to $X_1 + X_2 \leq 50$

$25X_1 + 50X_2 \leq 2000 + X_3$

$X_1, X_2 \geq 0$ $X_3 \geq 0$

X_3 : number of hours of hired labour

Matrix writing

Maximize CX

With $AX \leq B$

$X \geq 0$

$X \quad (450, 1000, -15)$

$$A \begin{pmatrix} 1 & 1 & 0 \\ 25 & 50 & -1 \end{pmatrix}$$

$$B \begin{pmatrix} 50 \\ 2000 \end{pmatrix}$$

ModelEco

Afficher des résultats sous forme de tableau

```
Parameter RESULT(*,*);
Result('income', 'euros') = Z.l;
Result('maize','land')= X.l('maize');
Result('maize','gross margin')= GM('mais');
Result('wheat','land')= X.l('wheat');
Result('weat','gross margin')= GM('wheat');
Display result ;
```

- Create a Result parameter
- Fill this parameter
- Display it in the .lst file

! Remember to include all relevant variables !

	Euros	Surface	Marge brute
Revenu	40000		
Mais		50	1000
blé		0	450