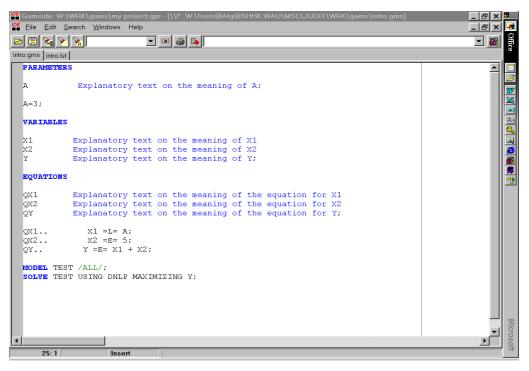
SOLUTION FOR THE EXERCISES 1

Results from 1.1.1.

Your desktop should look similar to this:

Gamside: W:\WRK\gams\my project.gp	r	•
<u>File</u> <u>E</u> dit <u>S</u> earch <u>W</u> indows Help		
New Ctrl+N Open Ctrl+O Reopen Alt+R Openin NewWindow Shift+Ctrl+O		🌆 Office 📘
Browse GAMS Model Library Browse User Model Library Project	Open Project	
Run F9 Compile Shitt+F9	Previous New Project	
Save Cri#S Save as Save All Shift+Cri+S <u>C</u> iose		
Options Print Previous ►	AMS Modeling for the Real World	7
Egit		
		Microsoft

Results from 1.1.2.



Results from 1.1.3.

After running the model, the GAMS-IDE should look similar to this¹:

	🭇 🔌 💊 🔽	💌 (a) 🎒 🕒		
		SHHK.WAU\MSC\JUDIT\WRK	(\g 💶 🗙	No active process
ntro.gms	intro.lst			intro
JGAM	8 2.50E	Windows NT/95/98		INTRO.GMS(24) 2 Mb
Ge	neral	Algebraic	Mode	3 rows, 3 columns, and 5 non-zeroes.
Cor	npila	tion		INTRO.GMS(24) 2 Mb
				Executing MINOS5
1	PARAMETE:	RS		MINOS5 May 18, 2000 WIN.M5.M5 19.3 10
2		Development of the second second		
3	A	Explanatory text c	on the me	Work space allocated 0.04 Mb
4	A=3;			Reading data
5	A-3;			Itn 0 Feasible solution. Objective =
7	VARTABLE	a		Ten 5 reasible solucion. Objective -
Ŕ	VARIABBE	5		
9	X1	Explanatory text on	the mea	EXIT OPTIMAL SOLUTION FOUND
10	x2	Explanatory text on		
11	Y	Explanatory text on		Major, Minor itns 1 0
12				Objective function 8.00000000000E+00
13	EQUATION	S		Degenerate steps 0 0.00
14				Norm X, Norm PI 4.84E+00 5.00E+00
15		Explanatory text on		Norm X, Norm PI 1.21E+01 2.00E+00
16		Explanatory text on		Restarting eDouble-Click to Open File
17	QY	Explanatory text on	the mea	INTRO.GMS(24) 0 Mb
18				Reading solution for model TEST
19	<i>k</i>	X1 =L= A;		*** Status: Normal completion
20	~	X2 =E= 5;		║┫╡ ┣
21 22	QY	Y =E= X1 + X2;		
	MODEL TE	cm /ътт/.		
23	MODEL TE	ST /ALL/;		Close Open Log Cummary only CUpdate

Results from 1.1.4.

In our simple example, the report on the variables should be as follows :

	LOWER		LEVEL	UPPER	MARGINAL
VAR X1	-INF		3.0000	+INF	•
VAR X2	-INF		5.0000	+INF	
VAR Y	-INF		8.0000	+INF	
Xl	Explanatory te	ext on	the meaning	of Xl	
X2	Explanatory te	ext on	the meaning	of X2	
Y	Explanatory te	ext on	the meaning	of Y	

Therefore, the optimal values for variables x_1 , x_2 and y are 3, 5 and 8 respectively. Note that none of the variables has an lower or upper bound. INF means infinity, so the variables can take infinitely large and small values. The marginal value of all variables is zero, which confirms that the solution found is optimal.

¹ If you use a different solver than Minos, the process window will look different, but the same essential information is displayed.

Results from 1.1.5.

Gamside: W:\WRK\gams\my project.gpr
Image: Shirt Way (MSC) JUDIT (WRK)g Image: Shirt Way (MSC) JUDIT (WRK)g
intro.gms intro.lst
DGAMS 2.50E Windows NT/95/98
General Algebraic Mode GAMS 2.50E Copyright (C) 1987-2000 GAMS Deve
Compilation Mageningen Agricultural University
1 PARAMETERS Starting Compilation INTRO.GMS(20) 1 Mb 1 Error
2 *** Error 409 in \\F_W USERS@ALG@SHHK.WAU\MSC\J
3 A Explanatory text on the me Unrecognizable item - skip to find a new st
4 looking for a ';' or a key word to get st
5 A=3; 6 INTRO.GMS (24) 1 Mb 2 Errors *** Error 257 in \\F W USERS@ALG@SHHK.WAU\MSC\J
7 VARIABLES Solve statement not checked because of prev
8 INTRO-GMS (24) 1 Mb 2 Errors
9 X1 Explanatory text on the mea *** Status: Compilation error(s)
10 X2 Explanatory text on the mea Exit code = 2
11 Y Explanatory text on the mea
12 13 EOUATIONS
14
15 QX1 Explanatory text on the mea
16 QX2 Explanatory text on the mea
17 QY Explanatory text on the mea
18
19 QX1 X1 =L= A 20 QX2 X2 =E= 5;
**** \$409
21 OY
22
22 Close Open Log T Summary only T Update
19: 22 Insert

Removing the semi-colon from equation QX1 results in the following window: At the end of the listing file the list of errors are explained:

"409 Unrecognizable item - skip to find a new statement; looking for a ';' or a key word to get started again" is displayed.

Results from 1.1.6.

The problem is UNBOUNDED, because you can keep lowering the value of Y by lowering X1. Remember that X1 should be less than A, not equal to. So X1 can get any value below 3. Consequently, Y can get any value below 8. The minimum is then minus infinity; GAMS reports this as unbounded.

The listing file gives the following solve summary:

* * * *	SOLVER STATUS	1	NORMAL	COMPLETION
* * * *	MODEL STATUS	3	UNBOUND	ED

Results from 1.1.7.

The results for the variables when the tax rate (tax) equals 30 is:

	LOWER	LEVEL	UPPER	MARGINAL
VAR DAMAGE	-INF	6000.0000	+INF	
VAR ST_RATE	-INF	0.5000	+INF	
VAR CATTLE	-INF	500.0000	+INF	•
VAR OBJ	-INF	4000.0000	+INF	

For tax=20, obj equals 6000; for tax=10, obj equals 6000 and for tax=0, obj equals 4000; the optimal value of tax is 15, when obj equals 6250.

Make sure that you use the explanatory text.

Results from 1.1.8.

---- VAR CO2

---- VAR PRD

The values of X1 and Y should be identical to the earlier exercises: 3 and 8, respectively.

Did you think of removing the equation declaration and the equation definition for Qx2?

The full model for emissions can look like this:

```
PARAMETERS
     coef Emission coefficient CO2
     OTHER Emissions of other greenhouse gasses;
     Coef=0.03;
     OTHER=5;
VARIABLES
     CO2 Emissions of CO2
     PRD Production quantity
     EMIS Total emissions of greenhouse gasses;
EQUATIONS
     QPRD Equation for economic production
     QCO2 Equation for CO2 emissions
     QEMIS Equation for total climate emissions;
        PRD =G= 100;
QPRD..
         CO2 =E= coef*PRD;
QCO2..
QEMIS.. EMIS =E= CO2+OTHER;
MODEL CLIMATE /ALL/;
SOLVE CLIMATE USING DNLP MINIMIZING EMIS;
With solution:
                     LOWER
                               LEVEL
                                        UPPER MARGINAL
                      -INF 8.000
-INF 3.000
---- VAR EMIS
                                        +INF
```

-INF 100.000

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+INF

+INF