

## HP Prime TORA

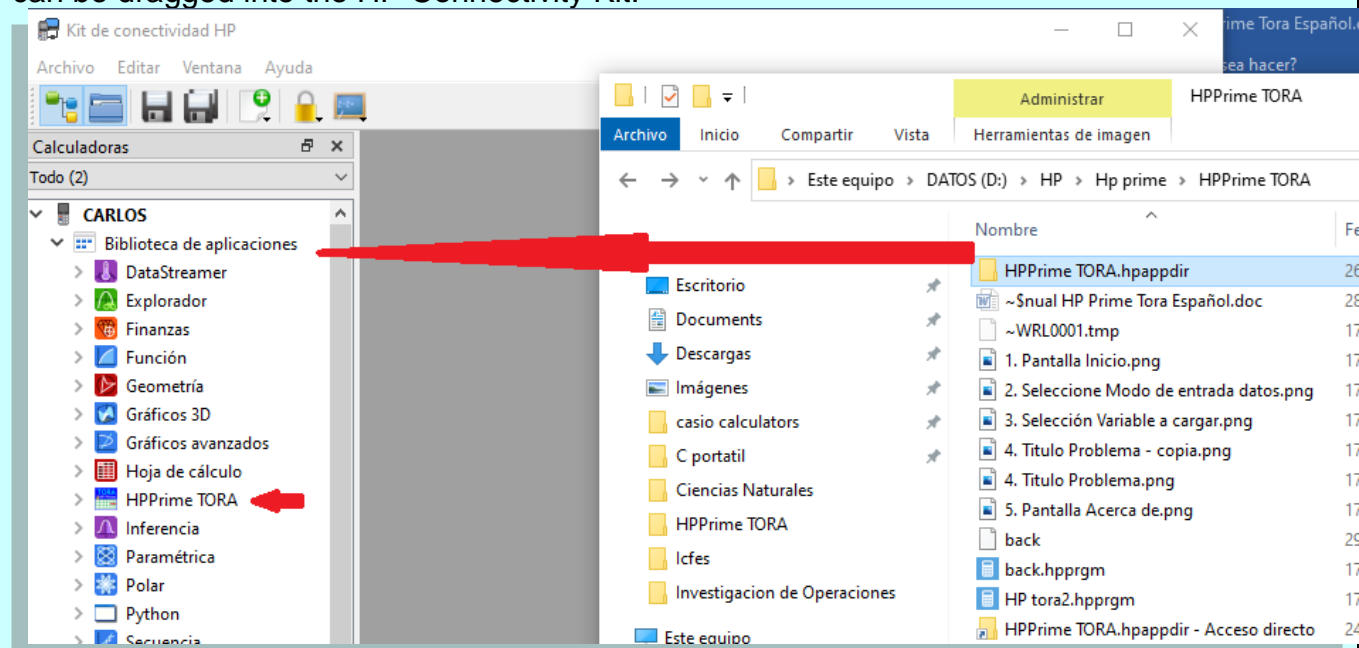
Platform: *HPPrime*  
Software version: *2.1.14730 (2023 04 13)*  
Hardware version: *D*  
Programming: *HP PPL*  
Calculator Mode: *Radians, Standard Number Format*  
Type: *App*  
Version: *1.4 (31/01/2025)*  
Size in HPPRime: *246 KB*

### Description

HP PRIME TORA is a program to solve Linear Programming exercises with the simplex method (variants of Constraints  $\leq$ , Gran M, Two Phases, Dual Simplex) and the Graphic method.

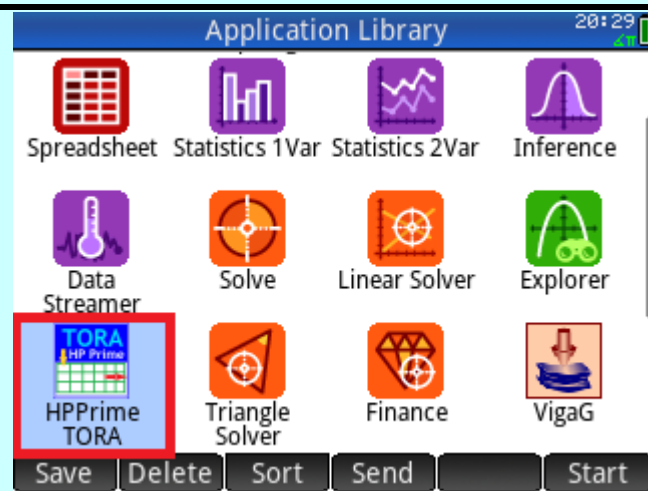
### Installation:

With the calculator connected or with the emulator open, the HPPRime TORA.hpappdir folder can be dragged into the HP Connectivity Kit:

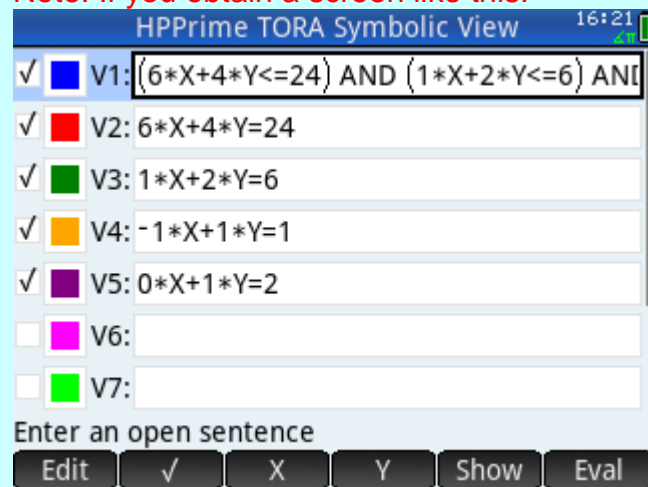




### Using the program:

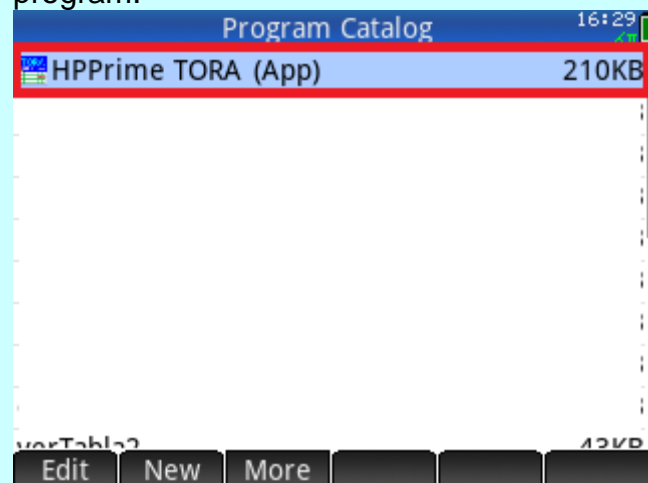
Once the program is installed as an application, it will appear in the Application Library from where it can be opened by clicking on it or selecting it and pressing Enter:



Note: If you obtain a screen like this:



Then you have to compile the program again: Press  +  and select the app program:



After that press Edit then Check and OK:

```

HPPrime TORA:Main(PPL) 16:33
1 //*****
2 // HP Prime TORA 1.3b
3 // By Carlos Navarro Cera
4 // En esta versión 1.3:
5 // -se cambia fondo para visualizar
6 // -Se muestra en el método gráfico
7 //*****
8 #pragma mode( separator(.,;) integer(h
9
10 HPPrimeTORA(); //Prototipo
11 LOCAL tituloProblema:="", fObj;
12 LOCAL MatrizRes, ListaSignos, MatrizRH
13 LOCAL osMaximizar, osMinimizar;

```



Cmds Tmplt Page More **Check**

```

HPPrime TORA:Main(PPL) 16:38
1 //*****
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4 // En esta versión 1.3:
5 // -se cambia fondo para visualizar
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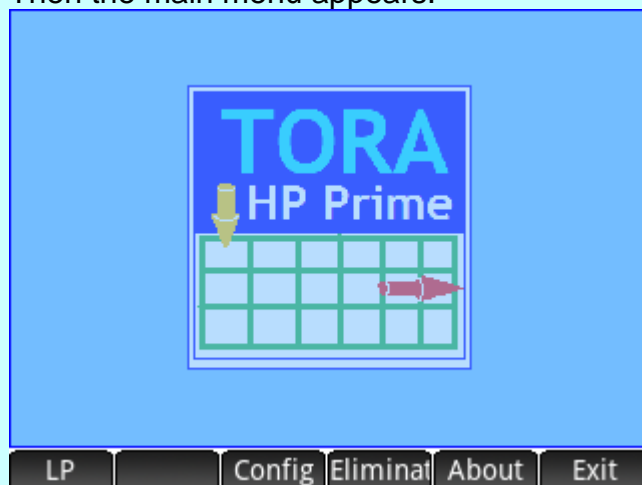
```

**i** No errors in the program OK

Finally, press OK ,    
 Then a welcome screen will appear:



This screen can be skipped by pressing Enter or Esc  
 Then the main menu appears:



In this screen you must select the first button of the Menu (PL) and it will ask if you want to Enter a New Problem or Select a stored variable.

**Introduce A New Problem:**

With this option you must write all the data of the problem (later it will ask if you want to save that data in a variable), for example:

If you want to solve the example of the book Operations Research (Taha), Reddy Mikks model:

$$\text{Maximize } z = 5x_1 + 4x_2$$

subject to

$$6x_1 + 4x_2 \leq 24 \quad (1)$$

$$x_1 + 2x_2 \leq 6 \quad (2)$$

$$-x_1 + x_2 \leq 1 \quad (3)$$

$$x_2 \leq 2 \quad (4)$$

$$x_1, x_2 \geq 0 \quad (5)$$

You must write: (non-negativity restrictions are implicit, that's why 4 restrictions are written):

After giving OK, it will request the Objective Function (Maximize  $z = 5x_1 + 4x_2$ ), which must be written as a matrix:

After giving OK, it will ask for the first restriction:  $6x_1 + 4x_2 \leq 24 \quad (1)$ , which must also be written on the left side of the inequality in matrix form:

Constraint No 1 20:31

[[6, 4]] <= 24

Constraint in matrix form

6	4	±
±	±	

Cancel OK

Then the same should be done with the following constraints:

Constraint No 2 20:32

[[1, 2]] <= 6

Constraint in matrix form

1	2	±
±	±	

Cancel OK

$$(x_1 + 2x_2 \leq 6)$$

Constraint No 3 20:32

[[−1, 1]] <= 1

Constraint in matrix form

−1	1	±
±	±	

Cancel OK

$$(-x_1 + x_2 \leq 1)$$

Constraint No 4 20:33

[[0, 1]] <= 2

Constraint in matrix form

0	1	±
±	±	

Cancel OK  $(x_2 \leq 2)$

Then it will ask if we want to save the data. If we select Yes, it will request a variable name, which can be selected in case we want to solve the same exercise by another method (such as the Graph method):

Save Problem 20:35

Variable name: NoName

Write variable name

ReddyMikks

Cancel OK

The variable name must conform to the HP Prime variable naming rules, otherwise it will not save anything.

Then it will ask the method to select:

HPPrime TORA 20:36

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Select method:

- 1 All constraints <=
- 2 M-method
- 3 Two-phase method
- 4 Dual Simplex
- 5 Graphic

OK

In this case, since all the constraints are  $\leq$ , you can use the first method (All constraints  $\leq$ ) and the Graph method (since there are two variables:  $x_1$  and  $x_2$ )

### All constraints $\leq$ :

The right hand side of all inequalities must be positive. The first Simplex table will appear:

All Const. < Tableau 1 [Reddy Mikks]							
Z(max)	X1	X2	s1	s2	s3	s4	SOLUTION
Basic	-5.00	-4.00	0.00	0.00	0.00	0.00	0.00
s1	6.00	4.00	1.00	0.00	0.00	0.00	24.00
s2	1.00	2.00	0.00	1.00	0.00	0.00	6.00
s3	-1.00	1.00	0.00	0.00	1.00	0.00	1.00
s4	0.00	1.00	0.00	0.00	0.00	1.00	2.00
Enter X1 leave s1							

The variable that enters for the next iteration will be highlighted with green lines and the variable that leaves will be highlighted in red. At the top of the table it will show the selected method, the iteration number and the problem name. At the bottom will appear the input variable and the output variable.

Either Esc or Enter must be pressed to continue to the next table or iteration.

All Const. < Tableau 2 [Reddy Mikks]							
Z(max)	X1	X2	s1	s2	s3	s4	SOLUTION
Basic	0.00	-0.67	0.83	0.00	0.00	0.00	20.00
X1	1.00	0.67	0.17	0.00	0.00	0.00	4.00
s2	0.00	1.33	-0.17	1.00	0.00	0.00	2.00
s3	0.00	1.67	0.17	0.00	1.00	0.00	5.00
s4	0.00	1.00	0.00	0.00	0.00	1.00	2.00
Enter X2 leave s2							

(tableau 2)

All Const. < Tableau 3 (optimum) [Reddy Mikks]							
Z(max)	X1	X2	s1	s2	s3	s4	SOLUTION
Basic	0.00	0.00	0.75	0.50	0.00	0.00	21.00
X1	1.00	0.00	0.25	-0.50	0.00	0.00	3.00
X2	0.00	1.00	-0.13	0.75	0.00	0.00	1.50
s3	0.00	0.00	0.38	-1.25	1.00	0.00	2.50
s4	0.00	0.00	0.13	-0.75	0.00	1.00	0.50

Since two display decimal places were selected, the results are displayed that way. At the end, it shows a summary:

Summary Solution	
Title:	Reddy Mikks
Final iteration No.:	3
Final state:	(optimum)
Objective value (Max) =	21.00
X1 =	3.00
X2 =	1.50
s3 =	2.50
s4 =	0.50

In case of having selected to show the data as a fraction, they would look like:

HPTora Simplex Method 20:40

Problem title: Reddy Mikks

Maximize: ☒

Minimize: ☐

Nbr. of Variables: 2

No. of Constraints: 4

No. decimals: 2

Show as fraction: ☒

Show as fraction

All Const. < Tableau 3 (optimum) [Reddy Mikks]							
Z(max)	X1	X2	s1	s2	s3	s4	SOLUTION
Basic	0	0	3/4	1/2	0	0	21
X1	1	0	1/4	-1/2	0	0	3
X2	0	1	-1/8	3/4	0	0	3/2
s3	0	0	3/8	-5/4	1	0	5/2
s4	0	0	1/8	-3/4	0	1	1/2

Summary Solution	
Title:	Reddy Mikks
Final iteration No.:	3
Final state:	(optimum)
Objective value (Max) =	21
X1 =	3
X2 =	3/2
s3 =	5/2
s4 =	1/2

### Stored Variables:

If a stored variable is selected, several already loaded will appear:



**HPPrime TORA** 20:43

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**Select input mode:**

1 Introduce New Problem

2 **Select stored variable**

**Select the variable to load** 20:43

Variable: **√ datos0**

- datos1
- ReddyMikks
- Ejemplo3\_5\_3
- OzarkFarms
- Ejemplo2\_4\_1
- Ex2\_4\_9

Select from drop down list

OK

The variable datos0 and ReddyMikks contain the same information.  
 The variable datos1 contains example 3.4-1 from the Operations Research book (Taha).

**Big M method:**

**Example 3.4-1**

Minimize  $z = 4x_1 + x_2$

subject to

$3x_1 + x_2 = 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \leq 4$

$x_1, x_2 \geq 0$

**HPTora Simplex Method** 20:44

Problem title: **Ej3.4-1**

Maximize: ☐

Minimize: ☒

Nbr. of Variables:

No. of Constraints:

No. decimals:

Show as fraction: ☐

Problem name

Edit Cancel OK

**Objective Function** 20:44

Min Z= **[[4, 1]]**

Func Obj in matrix form

Edit Cancel OK

Constraint No 120:44

[[3, 1]] = 3

Constraint in matrix form

EditCancelOK

Constraint No 320:45

[[1, 2]] <= 4

Constraint in matrix form

EditCancelOK

Constraint No 220:45

[[4, 3]] >= 6

Constraint in matrix form

EditCancelOK

HPPRime TORA20:45

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Select method:  
1 All constraints <=  
2 M-method  
3 Two-phase method  
4 Dual Simplex  
5 Graphic

OK

M value

20:46

M value: 100

Write the value of M big

Edit

Cancel

OK

Met. Big M Tableau 2 [Ej3.4-1]

Z(min)	X1	X2	s1	s2	R1	R2	SOLUTION
Basic	0.00	167.00	-100.00	0.00	-232.00	0.00	204.00
X1	1.00	0.33	0.00	0.00	0.33	0.00	1.00
R2	0.00	1.67	-1.00	0.00	-1.33	1.00	2.00
s2	0.00	1.67	0.00	1.00	-0.33	0.00	3.00

Enter X2 leave R2

Met. Big M Tableau 4 (optimum) [Ej3.4-1]

Z(min)	X1	X2	s1	s2	R1	R2	SOLUTION
Basic	0.00	0.00	0.00	-0.20	-98.60	-100.00	3.40
X1	1.00	0.00	0.00	-0.20	0.40	0.00	0.40
X2	0.00	1.00	0.00	0.60	-0.20	0.00	1.80
s1	0.00	0.00	1.00	1.00	1.00	-1.00	1.00

Met. Big M Tableau 1 [Ej3.4-1]

Z(min)	X1	X2	s1	s2	R1	R2	SOLUTION
Basic	696.00	399.00	-100.00	0.00	0.00	0.00	900.00
R1	3.00	1.00	0.00	0.00	1.00	0.00	3.00
R2	4.00	3.00	-1.00	0.00	0.00	1.00	6.00
s2	1.00	2.00	0.00	1.00	0.00	0.00	4.00

Enter X1 leave R1

Met. Big M Tableau 3 [Ej3.4-1]

Z(min)	X1	X2	s1	s2	R1	R2	SOLUTION
Basic	0.00	0.00	0.20	0.00	-98.40	-100.20	3.60
X1	1.00	0.00	0.20	0.00	0.60	-0.20	0.60
X2	0.00	1.00	-0.60	0.00	-0.80	0.60	1.20
s2	0.00	0.00	1.00	1.00	1.00	-1.00	1.00

Enter s1 leave s2

Summary Solution

Title:Ej3.4-1

Final iteration No.:4

Final state: (optimum)

Objective value (Min) = 3.40

X1 = 0.40

X2 = 1.80

s1 = 1.00

## Double Phase Method:

HPTora Simplex Method

20:48

Problem title: Ej3.4-1

Maximize: ☐

Minimize: ☒

Nbr. of Variables: 2

No. of Constraints: 3

No. decimals: 2

Show as fraction: ☐

Problem name

Edit

Cancel

OK

Phase 1 Tableau 1 [Ej3.4-1]

Z(min)	X1	X2	s1	s2	R1	R2	SOLUTION
Basic	7.00	4.00	-1.00	0.00	0.00	0.00	9.00
R1	3.00	1.00	0.00	0.00	1.00	0.00	3.00
R2	4.00	3.00	-1.00	0.00	0.00	1.00	6.00
s2	1.00	2.00	0.00	1.00	0.00	0.00	4.00

Enter X1 leave R1

HPPRime TORA

20:49

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End of phase 1: Feasible solution  
found--Starting Phase 2

Phase 1 Tableau 3 (optimum) [Ej3.4-1]

Z(min)	X1	X2	s1	s2	R1	R2	SOLUTION
Basic	0.00	0.00	0.00	0.00	-1.00	-1.00	6.00E-12
X1	1.00	0.00	0.20	0.00	0.60	-0.20	0.60
X2	0.00	1.00	-0.60	0.00	-0.80	0.60	1.20
s2	0.00	0.00	1.00	1.00	1.00	-1.00	1.00

Phase 2 Tableau 4 [Ej3.4-1]

Z(min)	X1	X2	s1	s2	SOLUTION
Basic	-1.0E-11	-1.0E-12	0.20	0.00	3.60
X1	1.00	0.00	0.20	0.00	0.60
X2	0.00	1.00	-0.60	0.00	1.20
s2	0.00	0.00	1.00	1.00	1.00

Enter s1 leave s2

Phase 2 Tableau 5 (optimum) [Ej3.4-1]						Summary Solution	
Z(min)	X1	X2	s1	s2	SOLUTION	Title:Ej3.4-1	
Basic	-1.0E-11	0.00	0.00	-0.20	3.40	Final iteration No.:5	
X1	1.00	0.00	0.00	-0.20	0.40	Final state: (optimum)	
X2	0.00	1.00	0.00	0.60	1.80	Objective value (Min) = 3.40	
s1	0.00	0.00	1.00	1.00	1.00	X1 = 0.40	
						X2 = 1.80	
						s1 = 1.00	

### Dual Simplex Method:

HPTora Simplex Method	20:53	HPPrime TORA	20:53																																																																																																
Problem title: <input type="text" value="Ej3.4-1"/>		HP Prime TORA © 2023 Carlos Navarro Cera (HPCarnace) carnace@gmail.com Todos los derechos reservados																																																																																																	
Maximize: <input type="checkbox"/>		<div>             Select method:             <ul style="list-style-type: none"> <li>1 All constraints &lt;=</li> <li>2 M-method</li> <li>3 Two-phase method</li> <li>4 Dual Simplex</li> <li>5 Graphic</li> </ul> </div>																																																																																																	
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<b>Dual Simplex Tableau 1 [Ej3.4-1]</b>		<b>Dual Simplex Tableau 4 (optimum) [Ej3.4-1]</b>																																																																																																	
<table border="1"> <thead> <tr> <th>Z(min)</th> <th>X1</th> <th>X2</th> <th>s1</th> <th>s2</th> <th>s3</th> <th>s4</th> <th>SOLUTION</th> </tr> </thead> <tbody> <tr> <td>Basic</td> <td>-4.00</td> <td>-1.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> </tr> <tr> <td>s1</td> <td>3.00</td> <td>1.00</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>3.00</td> </tr> <tr> <td>s2</td> <td>-4.00</td> <td>-3.00</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> <td>-6.00</td> </tr> <tr> <td>s3</td> <td>1.00</td> <td>2.00</td> <td>0.00</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>4.00</td> </tr> <tr> <td>s4</td> <td>-3.00</td> <td>-1.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>1.00</td> <td>-3.00</td> </tr> </tbody> </table>	Z(min)	X1	X2	s1	s2	s3	s4	SOLUTION	Basic	-4.00	-1.00	0.00	0.00	0.00	0.00	0.00	s1	3.00	1.00	1.00	0.00	0.00	0.00	3.00	s2	-4.00	-3.00	0.00	1.00	0.00	0.00	-6.00	s3	1.00	2.00	0.00	0.00	1.00	0.00	4.00	s4	-3.00	-1.00	0.00	0.00	0.00	1.00	-3.00	<table border="1"> <thead> <tr> <th>Z(min)</th> <th>X1</th> <th>X2</th> <th>s1</th> <th>s2</th> <th>s3</th> <th>s4</th> <th>SOLUTION</th> </tr> </thead> <tbody> <tr> <td>Basic</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>-0.20</td> <td>-1.40</td> <td>3.40</td> </tr> <tr> <td>s1</td> <td>0.00</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> </tr> <tr> <td>X2</td> <td>0.00</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> <td>0.60</td> <td>0.20</td> <td>1.80</td> </tr> <tr> <td>X1</td> <td>1.00</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>-0.20</td> <td>-0.40</td> <td>0.40</td> </tr> <tr> <td>s2</td> <td>0.00</td> <td>0.00</td> <td>0.00</td> <td>1.00</td> <td>1.00</td> <td>-1.00</td> <td>1.00</td> </tr> </tbody> </table>			Z(min)	X1	X2	s1	s2	s3	s4	SOLUTION	Basic	0.00	0.00	0.00	0.00	-0.20	-1.40	3.40	s1	0.00	0.00	1.00	0.00	0.00	1.00	0.00	X2	0.00	1.00	0.00	0.00	0.60	0.20	1.80	X1	1.00	0.00	0.00	0.00	-0.20	-0.40	0.40	s2	0.00	0.00	0.00	1.00	1.00	-1.00	1.00
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s2	-4.00	-3.00	0.00	1.00	0.00	0.00	-6.00																																																																																												
s3	1.00	2.00	0.00	0.00	1.00	0.00	4.00																																																																																												
s4	-3.00	-1.00	0.00	0.00	0.00	1.00	-3.00																																																																																												
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s1	0.00	0.00	1.00	0.00	0.00	1.00	0.00																																																																																												
X2	0.00	1.00	0.00	0.00	0.60	0.20	1.80																																																																																												
X1	1.00	0.00	0.00	0.00	-0.20	-0.40	0.40																																																																																												
s2	0.00	0.00	0.00	1.00	1.00	-1.00	1.00																																																																																												
<input type="button" value="Enter X2 leave s2"/>																																																																																																			

Summary Solution
Title: Ej3.4-1
Final iteration No.: 4
Final state: (optimum)
Objective value (Min) = 3.40
s1 = 0.00
X2 = 1.80
X1 = 0.40
s2 = 1.00

### Graphic Method:

In this method, the feasible region of a linear programming model with two unknowns ( $x$ ,  $y$  or  $x_1$ ,  $x_2$ ) is visualized.

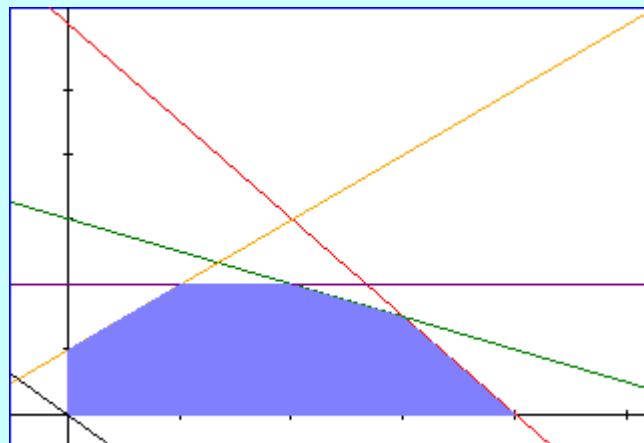
Selecting the same Reddy Mikks example:

HPTora Simplex Method	HPPrime TORA
Problem title: <input type="text" value="Reddy Mikks"/> Maximize: <input checked="" type="checkbox"/> Minimize: <input type="checkbox"/> Nbr. of Variables: <input type="text" value="2"/> No. of Constraints: <input type="text" value="4"/> No. decimals: <input type="text" value="2"/> Show as fraction: <input type="checkbox"/> Problem name <input type="button" value="Edit"/> <input type="button" value="Cancel"/> <input type="button" value="OK"/>	HP Prime TORA © 2023 Carlos Navarro Cera (HPCarnace) carnace@gmail.com Todos los derechos reservados <div>             Select method:              1 All constraints &lt;=              2 M-method              3 Two-phase method              4 Dual Simplex              5 Graphic           </div>

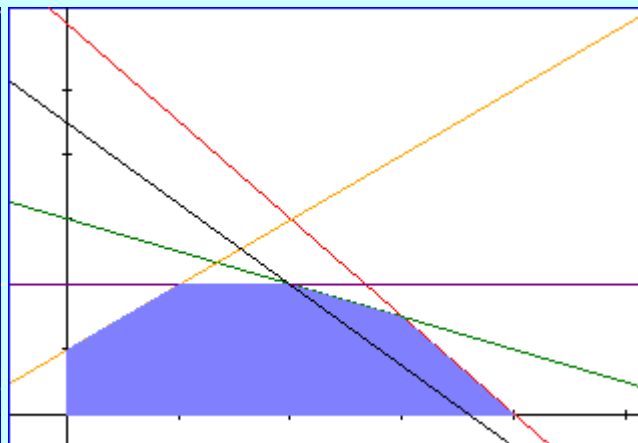
A calculation screen will appear (it can be slower in the real calculator, but in the emulator it is a bit faster. Possibly it will be fixed in future versions):

Calculating...17.93% Lines: 53

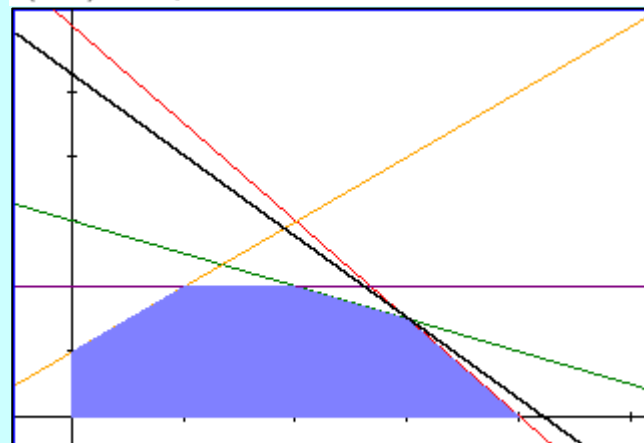
Then it will show at each vertex of the feasible region how the solution of the objective function changes:



Z(Max)= 0.00, X=0.00 Y=0.00



Z(Max)= 18.00, X=2.00 Y=2.00



Z(Max)=21.00 X=3.00 Y=1.50

It is possible that the final screen does not show an optimal solution, for example, when it is an unbounded area or there is no solution, so it must be checked with the other methods.

### Warning:

There may still be some errors, since I have my calculator since May 3, 2023 and this is my first program for the HP Prime, there may also be cumulative rounding errors due to the precision of the calculator.

### Thanks:

(in no specific order)

Edwin Córdoba for his VigaG program and for the help to make the Application work in the emulator (for those who have the same problem, you have to run the emulator with Windows 8 compatibility).

### Responsibility

I am not responsible for the possible damage that this program may cause at the data level or at the physical level in your calculator.

## Comments or suggestions

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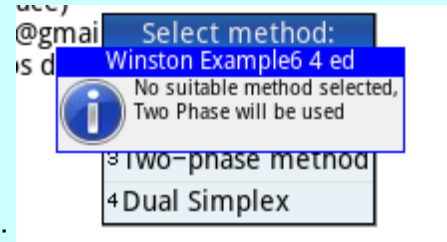
[carnace@gmail.com](mailto:carnace@gmail.com)

## Versions:

1.0 First version of the program (June 28, 2023).

### 1.2 (08/29/2023) :

- An application file (Config.txt) is now used to store program settings (such as maximum number of iterations, etc).



- A custom MSGBOX created with GROBs is now used:

- You can now use the touch panel in simplex tables:

Phase 1 Tableau 1 [Winston Example6 4 ed]

	X1	X2	X3	X4	s1	s2	s3
1	407.0000	208.0000	155.0000	509.0000	-1.0000	-1.0000	-1.0000
2	400.0000	200.0000	150.0000	500.0000	-1.0000	0.0000	0.0000
3	3.0000	2.0000	0.0000	0.0000	0.0000	-1.0000	0.0000
4	2.0000	2.0000	4.0000	4.0000	0.0000	0.0000	-1.0000
5	2.0000	4.0000	1.0000	5.0000	0.0000	0.0000	0.0000

scrolling with touch screen

General configuration 16:11

Epsilon: 0.000000001

Max Iterations: 100

Xmin: -0.5

Ymin: -0.5

Labels on Axes ☒

X Tick (Gr... 1 Auto X Tick (Graph Meth.) ☒

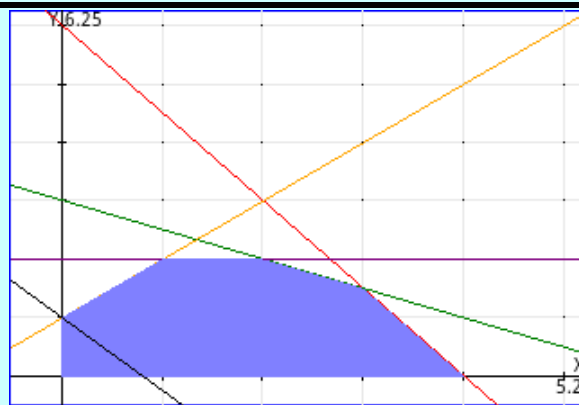
Y Tick (Gr... 1 Auto Y Tick (Graph Meth.) ☒

Enter the limit of E for the conversion to 0

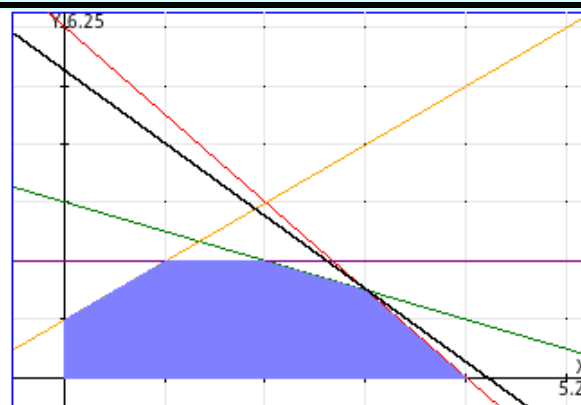
Edit Page 1/2 Cancel OK

- New Config Dialog:
- Improves the graphical method by showing grid:





Z(Max)= 4.00, X=0.00 Y=1.00



Z(Max)=21.00 X=3.00 Y=1.50

### 1.3 (02/10/2023):

- Dark Mode display is improved:

**HPTora Simplex Method**

Problem title: Reddy Mikks

Maximize: ☒

Minimize: ☐

Nbr. of Variables: 2

No. of Constraints: 4

No. decimals: 2

Show as fraction: ☐

blem name

dit Cancel OK

New in ver 1.3:

- Dark mode fixed.
- In graph method: constraints enumerated:

Z(Max)=21.00 X=3.00 Y=1.50

**HPTora Simplex Method**

Problem title: Ejemplo 2.4-7

Maximize: ☒

Minimize: ☐

Nbr. of Variables: 6

No. of Constraints: 8

No. decimals: 3

Show as fraction: ☐

Problem name

Edit Cancel OK

**Phase 2 Tableau 9 (optimum) [Ejemplo 2.4-7]**

s2	s3	s4	s5	s6	s7	s8	SOLUTION
0.000	6.700	7.200	8.100	0.000	0.000	2.15e-12	875000.0
0.000	-10.000	-7.187	-8.125	0.000	0.312	0.312	459375.0
1.000	-2.000	-0.875	-1.250	0.000	0.125	0.125	23750.00
0.000	11.000	0.000	0.000	1.000	0.000	0.000	550000.0
0.000	0.000	0.562	0.000	0.000	0.062	0.000	16875.00
0.000	0.000	0.000	0.375	0.000	0.000	0.063	15000.00
0.000	1.000	0.000	0.000	0.000	0.000	0.000	50000.00
0.000	0.000	0.437	0.000	0.000	-0.063	0.000	13125.00
0.000	0.000	0.000	0.625	0.000	0.000	-0.063	25000.00

Calculating...55.52% Lines: 162 TT: 6

**Summary Solution**

Title: Ejemplo 2.4-7

Final iteration No.: 9

Final state: (optimum)

Objective value (Max) = 875000.000

s1 = 459375.000

**HP Prime TORA**

Alternative solution detected

The next iteration will generate the alternative tableau

Enter X1

leave s6

X4 = 50000.000

X5 = 13125.000

X6 = 25000.000

Cancel OK

**Phase 2 Tableau 10 Alternative sol. [Ejemplo 2.4-7]**

s3	s4	s5	s6	s7	s8	SOLUTION	
10	6.700	7.200	8.100	-1.3e-12	0.000	2.15e-12	875000.0
10	-6.562	-7.187	-8.125	0.313	0.312	0.312	631250.0
10	-0.625	-0.875	-1.250	0.125	0.125	0.125	92500.00
10	0.687	0.000	0.000	0.062	0.000	0.000	34375.00
10	0.000	0.562	0.000	0.000	0.062	0.000	16875.00
10	0.000	0.000	0.375	0.000	0.000	0.063	15000.00
10	0.312	0.000	0.000	-0.063	0.000	0.000	15625.00
10	0.000	0.437	0.000	0.000	-0.063	0.000	13125.00
10	0.000	0.000	0.625	0.000	0.000	-0.063	25000.00

**Summary Solution**

Title: Ejemplo 2.4-7

Final iteration No.: 10

Final state: Alternative sol.

Objective value (Max) = 875000.000

s1 = 631250.000

s2 = 92500.000

X1 = 34375.000

X2 = 16875.000

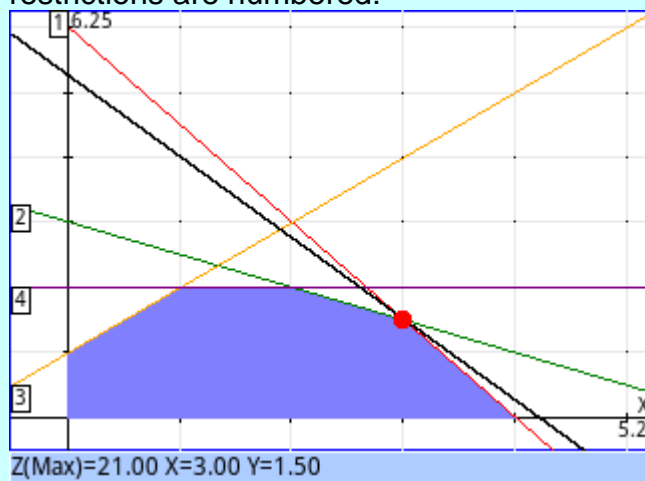
X3 = 15000.000

X4 = 15625.000

X5 = 13125.000

X6 = 25000.000

- In the graphical method the target value is now displayed in a red circle. In addition, the restrictions are numbered:



- The feasible point is shown in the graphical method in a red circle, the restrictions are listed
- ### 1.4: (January 31, 2025)

- Lexicographic tests are added (Prawda Juan. Métodos y Modelos de Investigación de Operaciones. Vol 1. Métodos determinísticos. México: Limusa. 2004. p. 122-126) 11/08/2024

**Limitations:**

- There may be rounding errors.
- In the Big M method, confusing results can be obtained when selecting an “inappropriate big M”, that is why this method is not used much in computers and the Two Phase method is usually used instead.
- This program is purely academic, so it is not a commercial program to be distributed with any payment. **This program is free.**
- I hope to fix the bugs and expand the capabilities of the program with other features.

**Bibliography**

Taha, Hamdy A. (2017) Operation Research. An Introduction. Tenth Edition. Pearson.