

# صياغة وحل نماذج البرمجة الخطية باستخدام برنامج الجداول الالكترونية (Excel)

اعداد

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العراق

## صياغة وحل نماذج البرمجة الخطية باستخدام برنامج الجداول الالكترونية (Excel)

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(Software)

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-1 :

<sup>1</sup>.

<sup>2</sup>.

1999

.( 1)

19-18

(2 )David R. A., etal "Quantitative methods for business" South-Western College Publishing , Ohio .2001, p 358.

)

(

3

-3

: 4

Simplex

.<sup>5</sup> Solver

-4

(C) (T)

1200

\$ 10

4

\$ 5000

. \$ 35

7

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(3 )Caine, D. J. and Parker B. J. "Linear programming comes of age: a decision support tool for every " .Journal of Management Decision. London :1996. Vol. 34 Iss. 4 : p 46

(4 )Zolfe A. F. Shalby "Solving linear programming models by spreadsheet software packages" Journal of faculty Economics and Administrative. King Abdul-Aziz University, Jeddah. :2000. Vol. 14. No. 2 p 4.

(5 ) Vijay G. " Financial analysis using Excel " VJ books Inc, Canada . 2002. p 227

. \$ 20                      \$ 9

Maximize Profit= 8C + 20T  
Subject to:

$$4C + 7T \leq 1200$$

$$10C + 35T \leq 5000$$

$$C \geq 0, T \geq 0$$

**-5**

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(                      )

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-

-

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-

:                      1

( F8:F9    B8:C9    B5:C5                      )

•

. data cells

)

•

.( C3    B3

. Changing cell

(                      )

•

equation

)

( D5 ) . ( . target cell ) • ) . ( . output cells ( D8:D9

(1)

	A	B	C	D	E	F
1						
2		كراسي	مناضد			
3	الحل	0	0			
4				الربح الاجمالي		
5	الربح	\$9.00	\$20.00	\$0.00		
6						
7				LHS		RHS
8	العمل	4	7	0	≤	1200
9	الخشب	10	35	0	≤	5000

2

SUMPRODUCT

. two range

B5\*B3

SUMPRODUCT(B5:C5,B3:C3)

)

. C5\*C3

SUMPRODUCT

. (

SUM

(2)

	A	B	C	D	E	F
1						
2		كراسي	مناضد			
3	الحل	0	0			
4				الربح الاجمالي		
5	الربح	9	20	=SUMPRODUCT(B5:C5;B3:C3)		
6						
7				LHS		RHS
8	العمل	4	7	=SUMPRODUCT(B8:C8;B3:C3)	≤	1200
9	الخشب	10	35	=SUMPRODUCT(B9:C9;B3:C3)	≤	5000

( ) target cell -

( )

. Tolls Solver •

Set

-: (3 ) solver target cell

-1

-2

Min Max •

(3)

	A	B	C	D	E	F	G
1							
2		كراسي	مناضد				
3	الحل	0	0				
4				الربح الاجمالي			
5	الربح	\$9.00	\$20.00	\$0.00			
6							
7				LHS		RHS	
8	العمل	4	7	0	≤	1200	
9	الخشب	10	35	0	≤	5000	

**Solver Parameters** ? X

Set Target Cell:  Solve

Equal To: ☒ Max ☐ Min ☐ Value of:  Close

By Changing Cells:  Guess

Subject to the Constraints:

Add  
Change  
Delete

Options  
Reset All  
Help

\*

Solver

. (4 )

-:

By changing Cell " "

-:

-1

-2

(4)

	A	B	C	D	E	F	G
1							
2		كراسي	مناضد				
3	الحل	0	0				
4				الربح الاجمالي			
5	الربح	\$9.00	\$20.00	\$0.00			
6							
7				LHS		RHS	
8	العمل	4	7	0	≤	1200	
9	الخشب	10	35	0	≤	5000	
10	Solver Parameters ? X						
11	Set Target Cell: \$E\$12						
12	Equal To: <input checked="" type="radio"/> Max <input type="radio"/> Min <input type="radio"/> Value of: 0						
13	By Changing Cells: \$B\$3:\$C\$3						
14	Subject to the Constraints:						
15							
16							
17							
18							
19							
20							
21							

. Solver Add

(5 ) Cell Reference " "

:

-1

-2

( <= )

:

Constraint

-1

-2

(5)

	A	B	C	D	E	F
1						
2		كراسي	مناضد			
3	الحل	0	0			
4				الربح الاجمالي		
5	الربح	\$9.00	\$20.00	\$0.00		
6						
7				LHS		RHS
8	العمل	4	7	0	≤	1200
9	الخشب	10	35	0	≤	5000

Add Constraint ? X

Cell Reference:   Constraint:

OK Cancel Add Help

. solver

Ok

-

6 Solver

solver (6)

Solver Parameters ? X

Set Target Cell:

Equal To: ☒ Max ☐ Min ☐ Value of:

By Changing Cells:

Subject to the Constraints:



Solver

Options

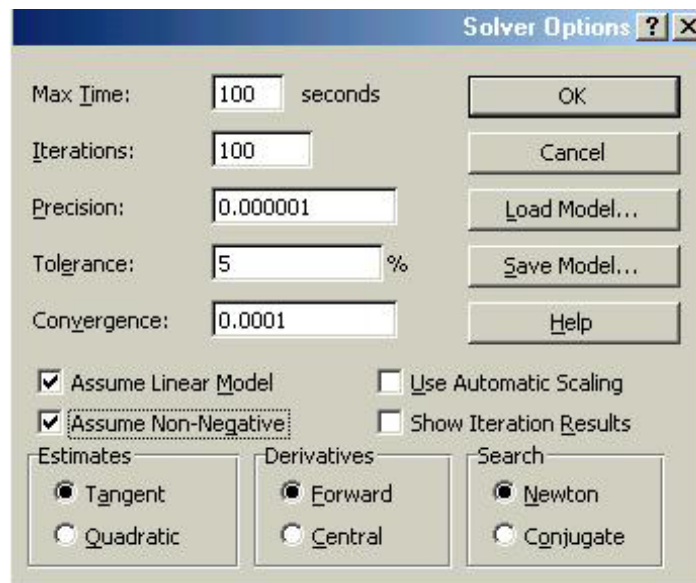
(7) Solver Option

" Assume Linear Model "

.Ok

. Assume Non-Negative "

(7)



Solve

:

"Solver found a solution. All constraints and optimality conditions are satisfied" -1

Solver

"Cell values did not converge" -2

"Solver could not find a feasible solution" -3

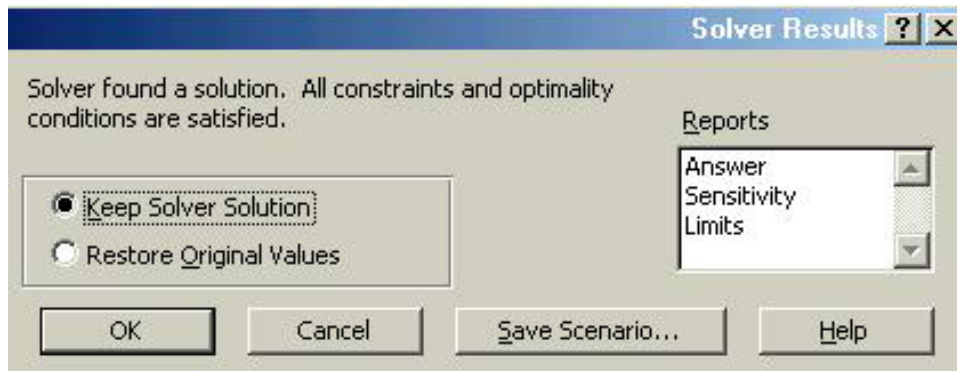
"Conditions for Assume Linear Model not Satisfied" -4

)

Solver

( 8

(8)



	A	B	C	D	E	F
1						
2		كراسي	مناضد			
3	الحل	100	114.29			
4				الربح الاجمالي		
5	الربح	\$9.00	\$20.00	\$3,185.71		
6						
7				LHS		RHS
8	العمل	4	7	1200	≤	1200
9	الخشب	10	35	5000	≤	5000

114.29

100

. \$ 3185.71

## Sensitivity analysis ( ) -6

answer report Solver

(10 ) .

(10)

Target Cell (Max)					
Cell	Name	Original Value	Final Value		
\$D\$5	الربح الاجمالي	\$3,185.71	\$3,185.71		
Adjustable Cells					
Cell	Name	Original Value	Final Value		
\$B\$3	الحل كراسي	100	100		
\$C\$3	الحل مناجند	114.2857143	114.2857143		
Constraints					
Cell	Name	Cell Value	Formula	Status	Slack
\$D\$8	LHS العمل	1200	\$D\$8<=\$F\$8	Binding	0
\$D\$9	LHS الخشب	5000	\$D\$9<=\$F\$9	Binding	0

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(11 ) .<sup>6</sup> (

1.64286 Shadow price

.1201 1200

(11)

Adjustable Cells						
Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
\$B\$3	الحل كراسي	100	0	9	2.428571429	3.285714286
\$C\$3	الحل مناجند	114.2857143	0	20	11.5	4.25
Constraints						
Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
\$D\$8	LHS العمل	1200	1.642857143	1200	800	200
\$D\$9	LHS الخشب	5000	0.242857143	5000	1000	2000

(6) Donald L. H. and James F. H. "Data , Statistics, and Decision Models with EXCEL" John Wily Sons, Inc. New York , 1998 . p 510.

Solver

Visual basic Application

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(7 ) Martin A. " An integrated introduction to spreadsheet and programming skills for operational research students " Journal of the Operational Research Society (2000)  
Vol. 51 p 1399

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. 1999

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1. Caine, D. J. and Parker B. J. "**Linear programming comes of age: a decision support tool for every** " .Journal of Management Decision. London :1996. Vol. 34 Iss. 4
2. David R. A., etal "**Quantitative methods for business**" South-Western College Publishing , Ohio .2001
3. Donald L. H. and James F. H. "**Data , Statistics, and Decision Models with EXCEL**" John Wily Sons, Inc. New York , 1998 .
4. Martin A. " **An integrated introduction to spreadsheet and programming skills for operational research students** " Journal of the Operational Research Society (2000) Vol. 51 p 1399
5. Vijay G. " **Financial Analysis using Excel** " VJ books Inc, Canada . 2002.
6. Zolfe A. F. Shalby "**Solving linear programming models by spreadsheet software packages**" Journal of faculty Economics and Administrative. King Abdul-Aziz University, Jeddah. :2000. Vol. 14. No. 2

# **Formulation and Solving linear programming Models using Spreadsheet Software ( Excel)**

**By**

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## **Abstract**

The aim of this paper focuses upon the importance of using spreadsheet software packages in solving many problems which faces the economists and decision maker in general and student in particular , the spreadsheet participate in simplifying many difficulty that face student: in getting the software of quantities analysis , the difficulty of understanding this software consume long time and its high price cost.

The spreadsheet are use in solving many models of practical linear programming in many field: like allocation recourses, production scheduling, management decision making, solve transportation problems... spreadsheet packages are easy to use , even for who have not a mathematics background in linear programming and quantitative analysis.

A numerical example is given to show the importance of this new technique.