

ACCOUNTRONIC SOFTWARE

# *Excel*

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صدق الله العظيم

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<b>Solver</b>		-
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<b>Multiple</b>	)	-
<b>QBasic</b>	<b>(Objective Programming</b>	

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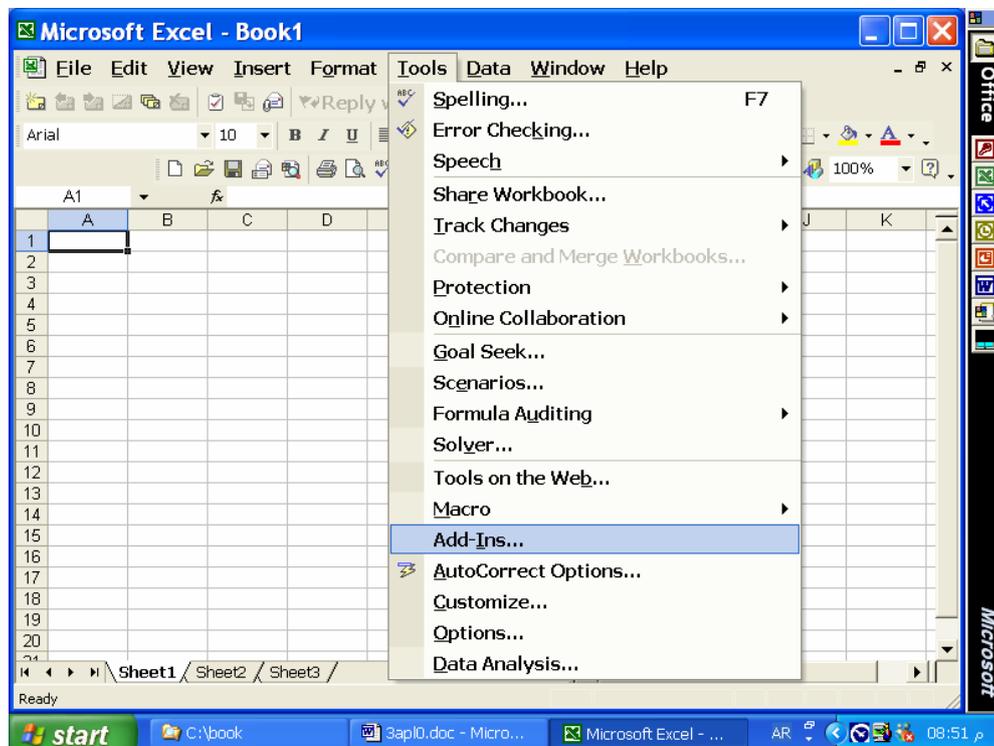
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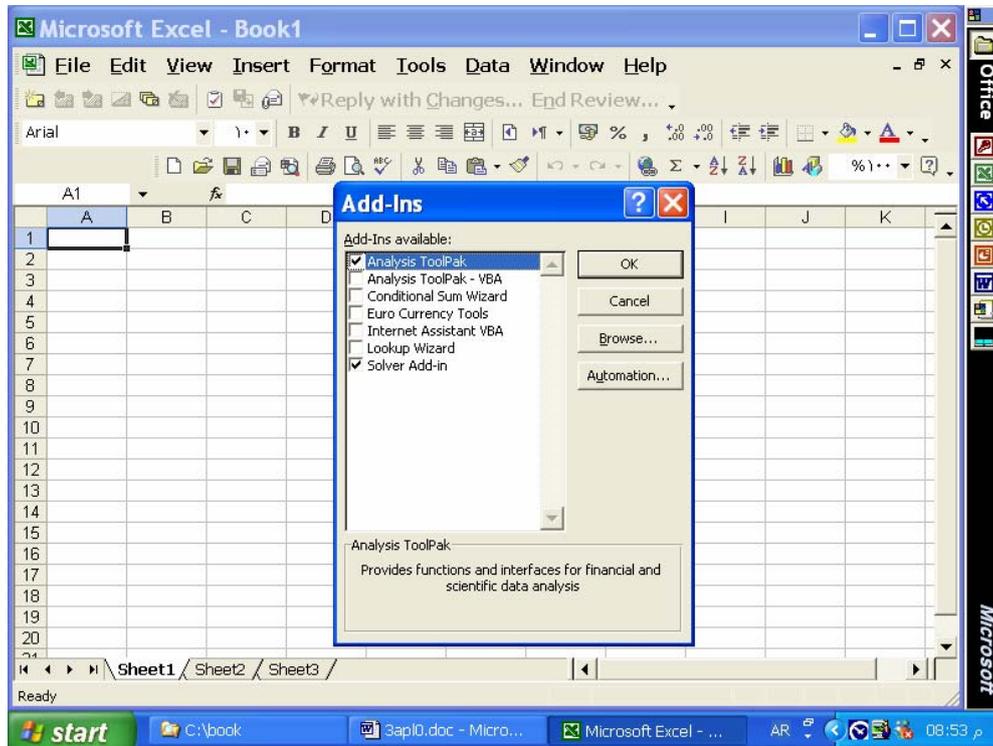
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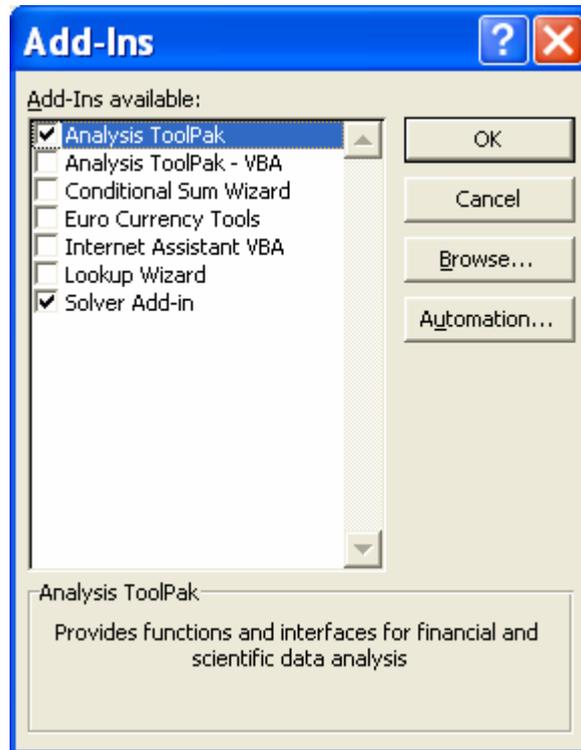
## *Solver*

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**Data Analysis (Analysis Solver  
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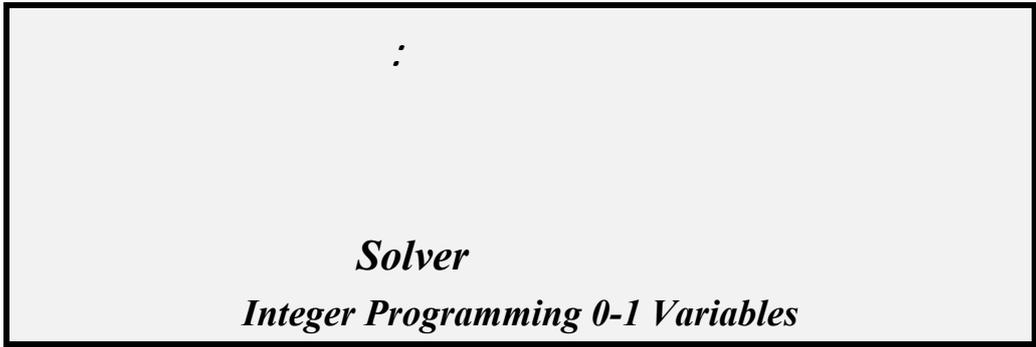


: Solver Analysis ToolPak



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OK



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 Solver ( / )

Data File: ip01.xls

Four 0-1 decision variables (projects) are considered for a firm capital budgeting:

P = 1 if the plant expansion project is accepted; 0 is rejected

W = 1 if the warehouse expansion project is accepted; 0 is rejected

M = 1 if the new machinery project is accepted; 0 is rejected

R = 1 if the new product research project is accepted; 0 is rejected

Project Net Present Value, Capital Requirements, and Available Capital

PROJECT 4					
	Plant Expansion	Warehouse Expansion	New Machinery	New Product Research	Total Capital Available
Present Vale	\$90000	\$40000	\$10000	\$37000	

<b>Year 1 Capital  1</b>	<b>15000</b>	<b>10000</b>	<b>10000</b>	<b>15000</b>	<b>40000</b>
<b>Year 2 Capital</b>	<b>20000</b>	<b>15000</b>		<b>10000</b>	<b>50000</b>
<b>Year 3 Capital</b>	<b>20000</b>	<b>20000</b>		<b>10000</b>	<b>40000</b>
<b>Year 4 Capital</b>	<b>15000</b>	<b>5000</b>	<b>4000</b>	<b>10000</b>	<b>35000</b>

**A 0-1 integer linear programming model (for this capital budgeting problem) with dollars in thousands is as follows:**

$$\text{Max } 90P + 40W + 10M + 37R$$

s.t.

$$15P + 10W + 10M + 15R \leq 40 \text{ (Year 1 capital available)}$$

$$20P + 15W + 10R \leq 50 \text{ (Year 2 capital available)}$$

$$20P + 20W + 10R \leq 40 \text{ (Year 3 capital available)}$$

$$15P + 5W + 4M + 10R \leq 35 \text{ (Year 4 capital available)}$$

$$P, W, M, R = 0, 1 \text{ (binary)}$$

**(Enter the above model parameters to excel worksheet and solve the model, data already entered to data file):**

**Decision Variables: Cells C20:F20.**

**Objective Function : Cell D16 =  
SUMPRODUCT(C6:F6;C20:F20).**

**Left-Hand Sides: Cells H17:H20**

$$\text{Cell H17} = \text{SUMPRODUCT}(C7:F7;C20:F20)$$

**Right-Hand Sides: Cells J17:J20**

1. Let the active cell D16 before performing Solver. Select "bin" (binary) when Adding first constraint. Select Solver Options and enter the parameters as shown in the following screens.
2. (a) Select the Tools pull-down menu, (b) Select the Solver option, (c) When the Solver Parameters dialog box appears enter D16 into the set cell box, select Equal To: Max option.

The following screens exhibit the above steps to solve the excel application (Note: Required data file is already saved on OR Data Files Subdirectory):

ip01.xls :

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$$\text{Max } 90P + 40W + 10M + 37R$$

s.t.

$$15P + 10W + 10M + 15R \leq 40 \text{ (Year 1 capital available)}$$

$$20P + 15W + 10R \leq 50 \text{ (Year 2 capital available)}$$

$$20P + 20W + 10R \leq 40 \text{ (Year 3 capital available)}$$

$$15P + 5W + 4M + 10R \leq 35 \text{ (Year 4 capital available)}$$

$$P, W, M, R = 0, 1 \text{ (binary)}$$

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Solver

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D17

Max

Solve

**Keep Solver Solution**

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Solver Options

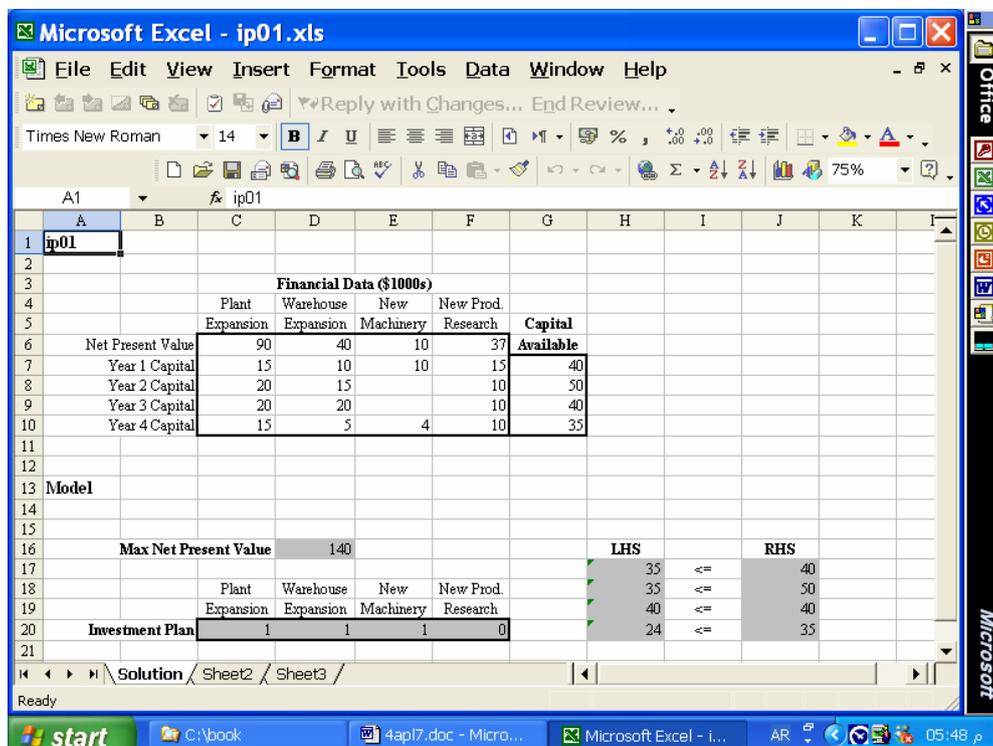
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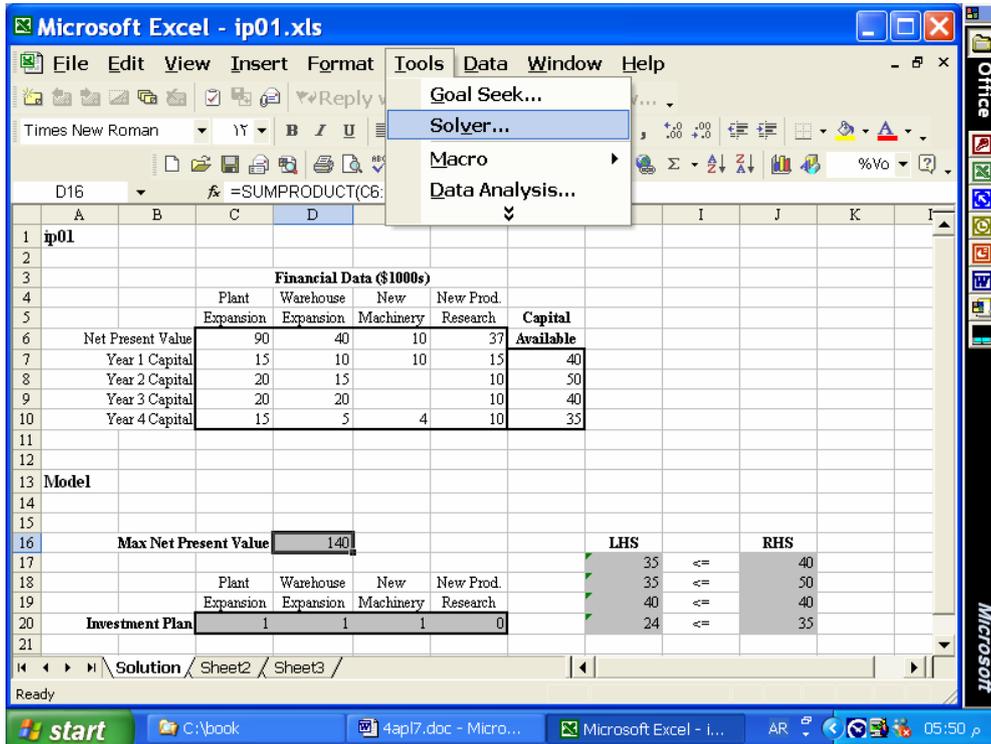
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OR Data

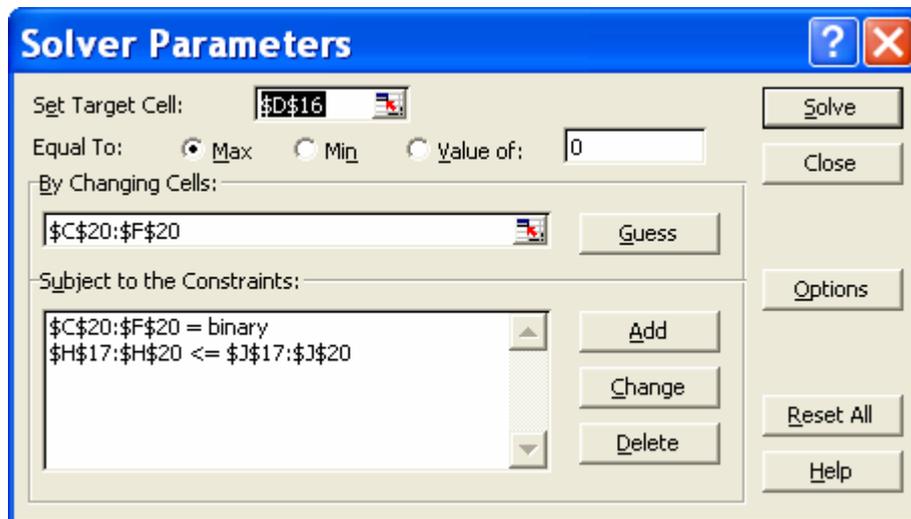
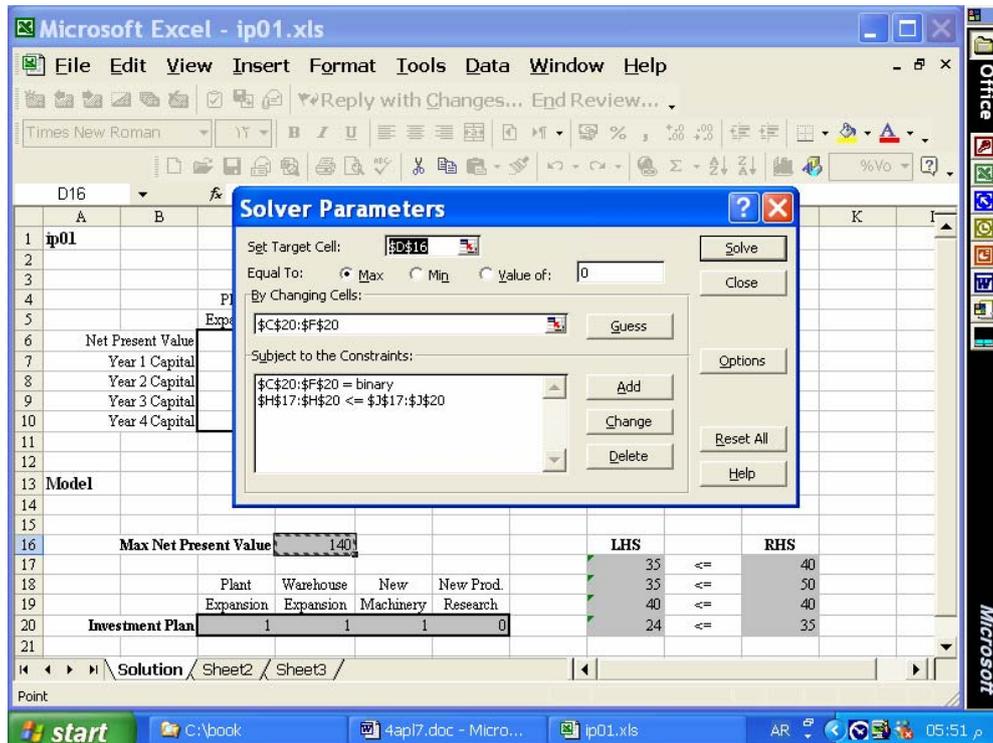
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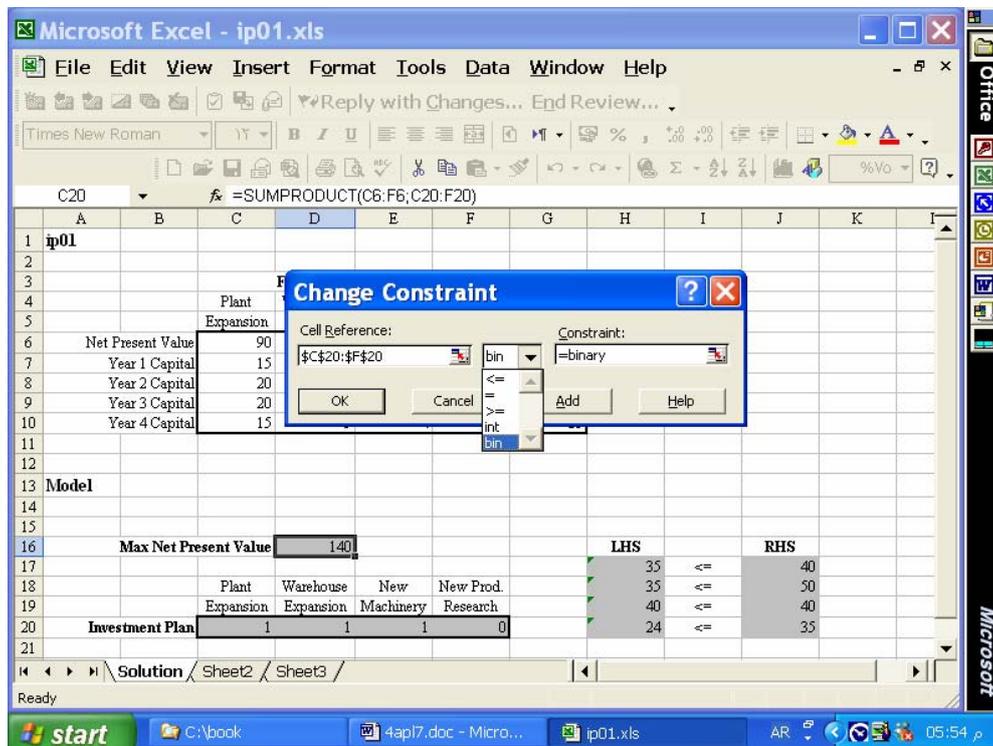
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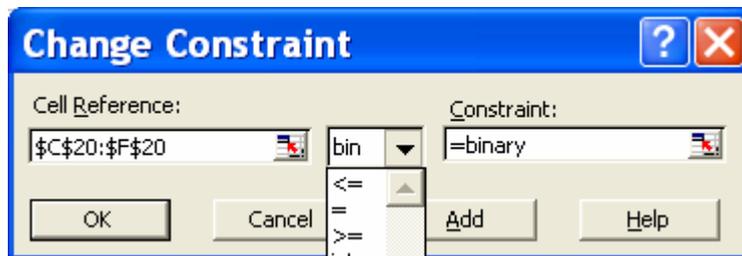


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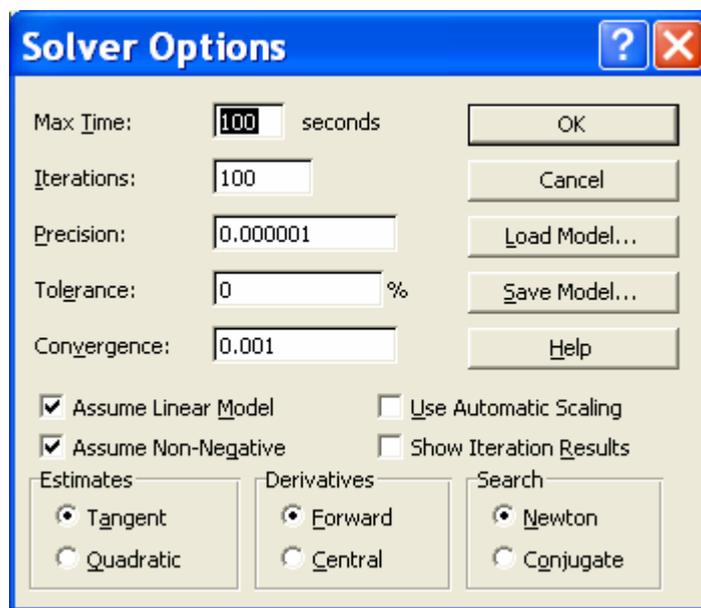
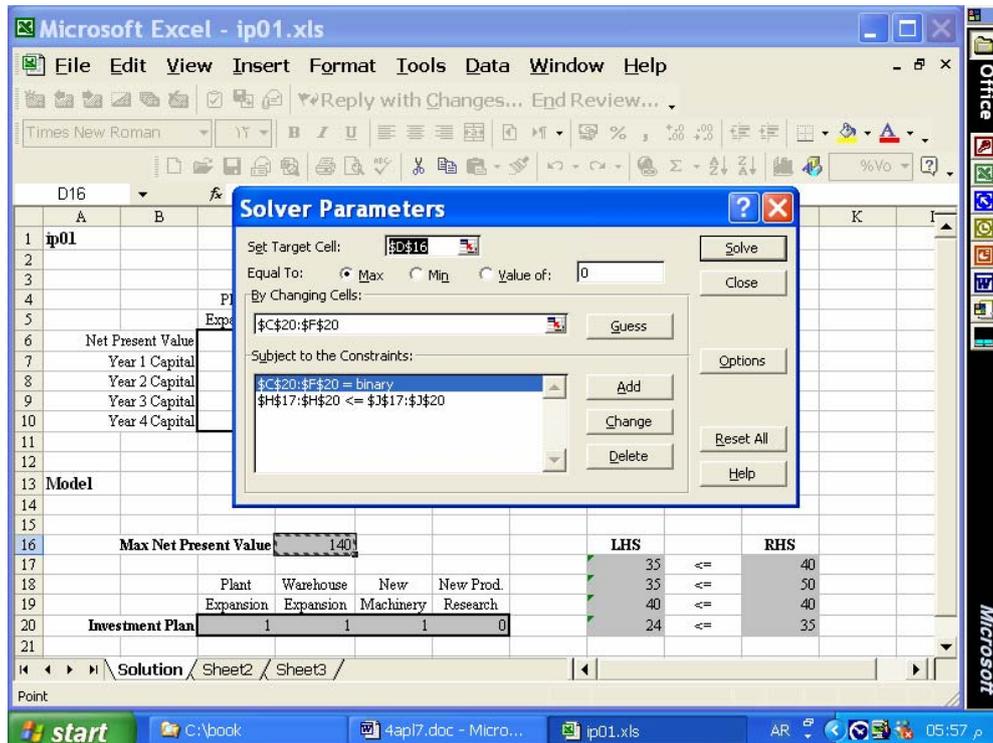




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The screenshot shows a Microsoft Excel window titled "ip01.xls" with a Solver Results dialog box open. The spreadsheet contains a linear programming model with the following data:

Model	Plant	Warehouse	New	New Prod.	LHS	RHS
Max Net Present Value					35	40
Year 1 Capital	Plant	Warehouse	New	New Prod.	35	50
Year 2 Capital	Expansion	Expansion	Machinery	Research	40	40
Year 3 Capital	Investment Plan	1	1	1	24	35
Year 4 Capital						

The Solver Results dialog box indicates that a solution has been found and all constraints and optimality conditions are satisfied. The "Keep Solver Solution" option is selected. The "Reports" section shows "Answer", "Sensitivity", and "Limits" are selected for generation.

Microsoft Excel - ip01.xls

File Edit View Insert Format Tools Data Window Help

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D16 =SUMPRODUCT(C6:F6;C20:F20)

1	ip01											
2												
3		<b>Financial Data (\$1000s)</b>										
4		Plant	Warehouse	New	New Prod.							
5		Expansion	Expansion	Machinery	Research	Capital						
6	Net Present Value	90	40	10	37	Available						
7	Year 1 Capital	15	10	10	15	40						
8	Year 2 Capital	20	15	10	10	50						
9	Year 3 Capital	20	20	10	10	40						
10	Year 4 Capital	15	5	4	10	35						
11												
12												
13	Model											
14												
15												
16	Max Net Present Value		140				LHS		RHS			
17							35	<=	40			
18		Plant	Warehouse	New	New Prod.		35	<=	50			
19		Expansion	Expansion	Machinery	Research		40	<=	40			
20	Investment Plan		1	1	1	0	24	<=	35			
21												

Solution / Sheet2 / Sheet3 /

Ready

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