DS

این نرم افزار یکی از ساده تری و کاملترین سری نرم افزارهای مهندسی صنایع است که در آن از نرم افزارهای کنترل کیفیت آماری گرفته تا کنترل پروژه و برنامه ریزی خطی یافت می شود.

هیچگونه برنامه نویسی ندارد و نرم افزار بصورت مدلهای از پیش طراحی شده ای در زمینه های تحقیق در عملیات –آمار- برنامه ریزی تولید –کنترل موجودی-ارزیابی کارو زمان و.... است

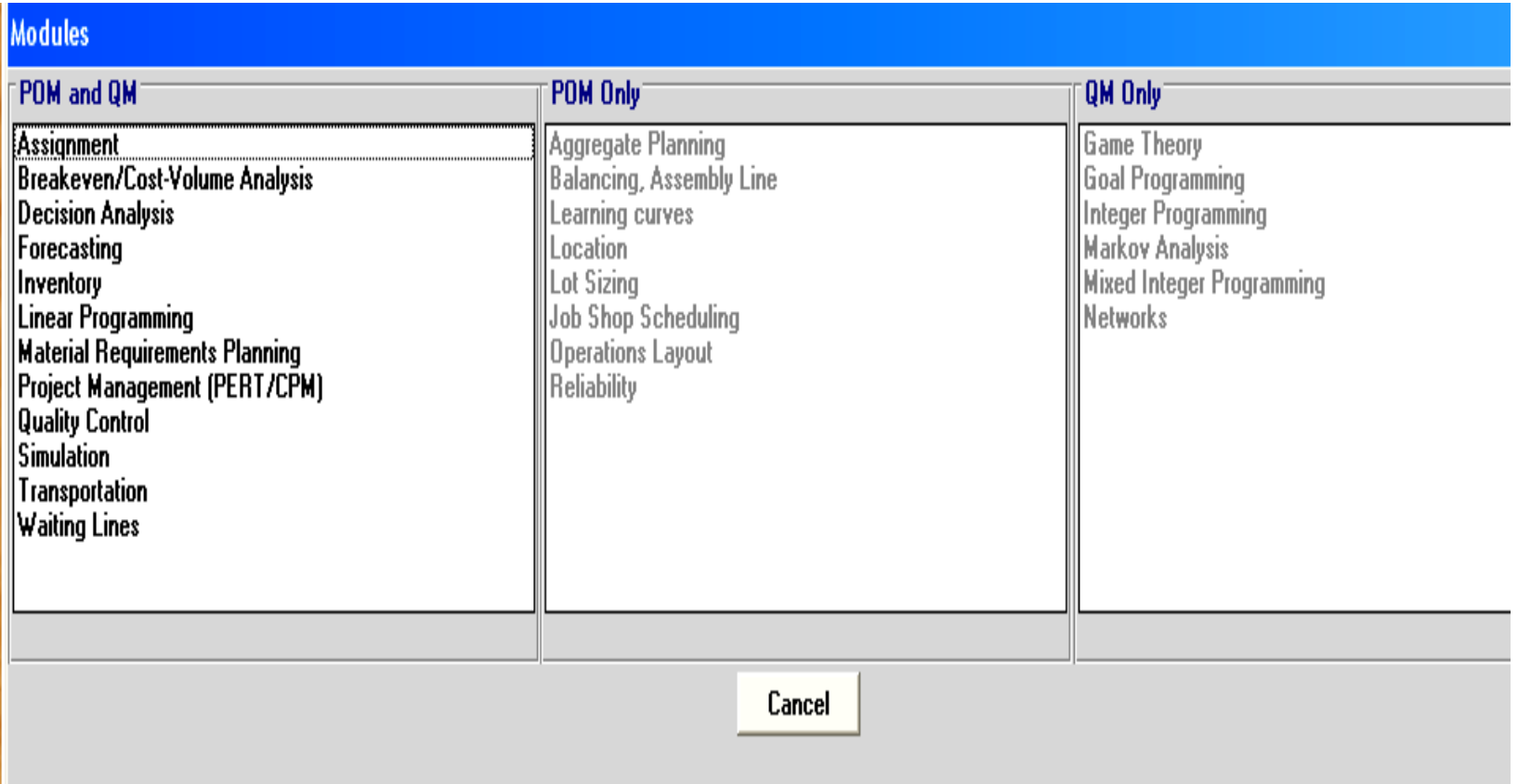
این نرم افزاردر سه باکس با عنوانهای

POM & QM:مدیریت تولید و عملیات و مدیریت کیفیت توامان

POM only :مدیریت تولید و عملیات تنها

QM only :مدیریت کیفیت تنها

صورت گرفته است کل زیر مجموعه های نرم افزاری این مجموعه 26عدد است که در شکل زیر معرفی شذه است



1-1: (*Assignment*):

تشریح حل مدلهای تخصیص:

مدل تخصیص حالت خاصی از از مدل برنامه ریزی خطی و مدل حمل و نقل است. می توان گفت یک مدل تخصیص مدل حمل و نقلی است که در آن

سطر وستون با هم برابر بوده و اعداد سمت راست تمام محدودیتها 1 است.

در مدل تخصیص هدف انجام ()تخصیص مثلا ()شغل به()فرد با کمترین هزینه یا بیشترین سود است.

پس از اجرای نرم افزار از داخل پنجره**Module:**

module ⟶ ***Assignment*** ⟶ ***File*** ⟶ ***New***

را انتخاب **Creating a new data set** باز می شود در سمت چپ آن کرده که بعد از آن پنجره

تعداد کار و ماشین را مشخص می کنیم ودر قسمت پایین تعیین می نماییم که مساله ما از کدام نوع *min* یا *max* *است و درقسمت راست آن تعیین*

می کنیم که متغیرها با جه علامتی مشخص شوند و سپس گزینه ***Ok***

را انتخاب کرده وجدولی که باید اعداد در آن وارد شوند باز می شود سپس بعد گزینه ***Solve***از وارد کردن اعداد را انتخاب می کنیم و مساله حل می شود

نکته:

اگردر وارد کردن داده ها مکان مبدا (***Job***.) و مقصد (***Machine***) عوض شوددر جواب مساله تغییری حاصل نمی شود مثال زیر مطلب را ر وشن می کند

	Machine 1	***Machine*** 2	***Machine3***
Job1	***15***	***10***	***26***
Job2	***12***	***11***	***28***
Job3	***13***	***14***	***22***

	Job 1	***Job*** 2	***Job3***
Machine1	***15***	***10***	***26***
Machine 2	***12***	***11***	***28***
Machine3	***13***	***14***	***22***

در آخر بعد از زدن گزینه ***Solve*** می توانیم با باز کردن پنجره های 1: ***Marginal costs*** 2: ***Original data*** 3: ***assignments*** 4: ***assignment list*** به ترتیب جدول نهایی و

و جدول اولیه و مجددا جواب بهینه را مشاهده نماییم.

1-***Marginal costs***: حاشیه سود وضرر

نتایج این زیر پنجره به حاشیه سود یا ضرر بنا به اقتضای مساله می پردازد یعنی نشان می دهد تخصیص غیر بهین چه مقدار ضرر یا سود بدنبال خواهد داشت که از مقایسات جفتی می توان به این تحلیل پرداخت.

2- ***Original data:***

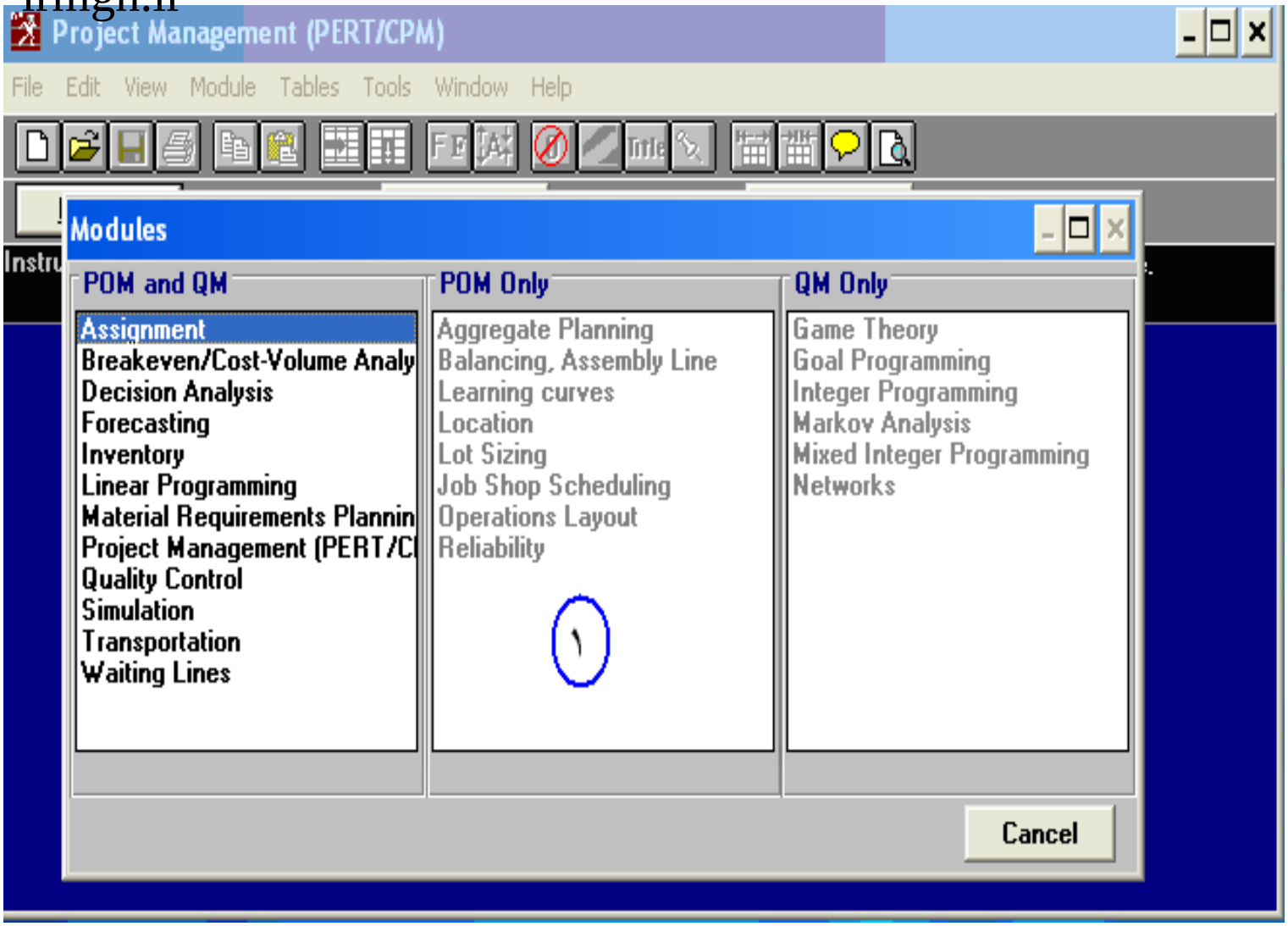
صورت مساله است

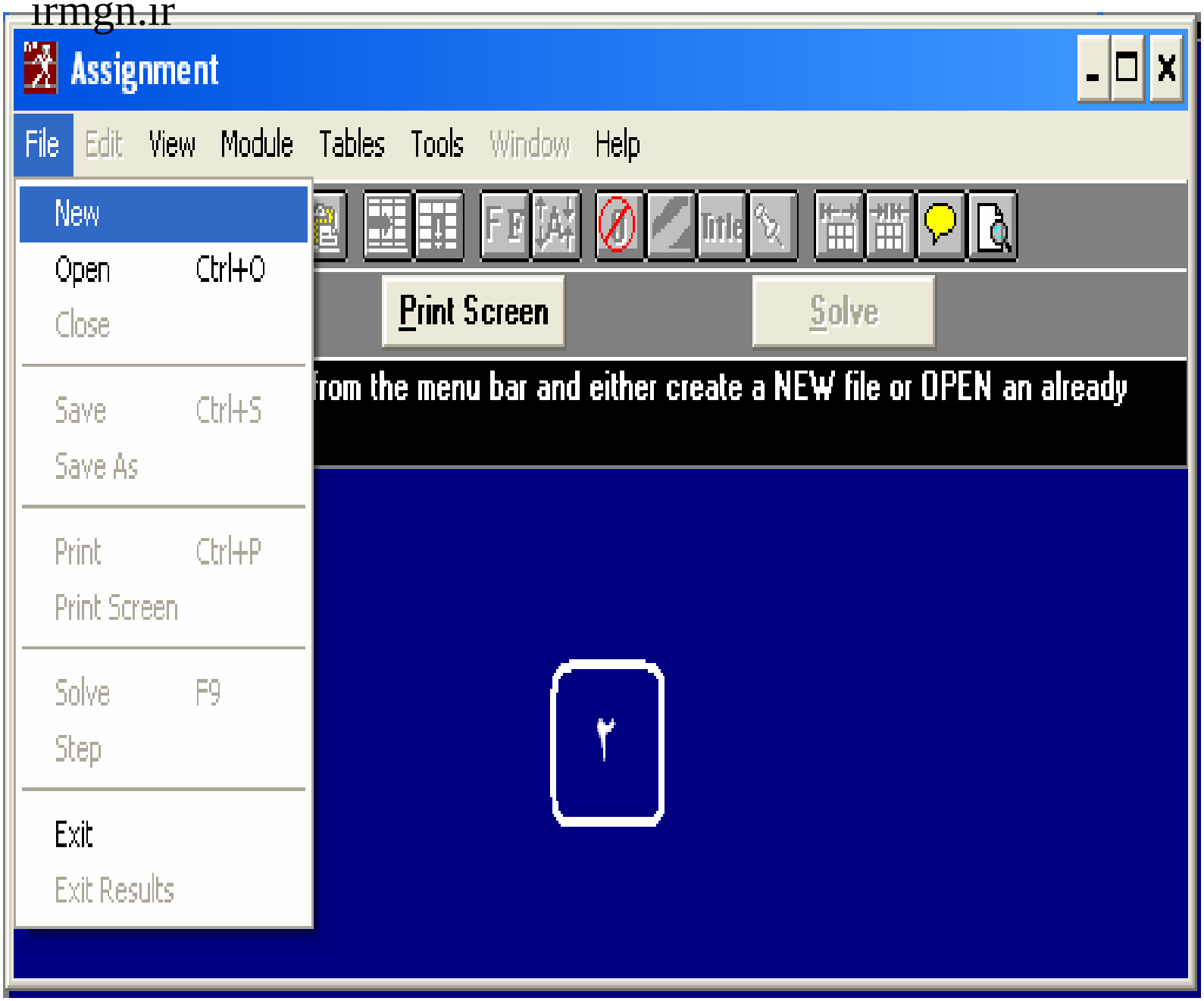
3- ***assignments*** :

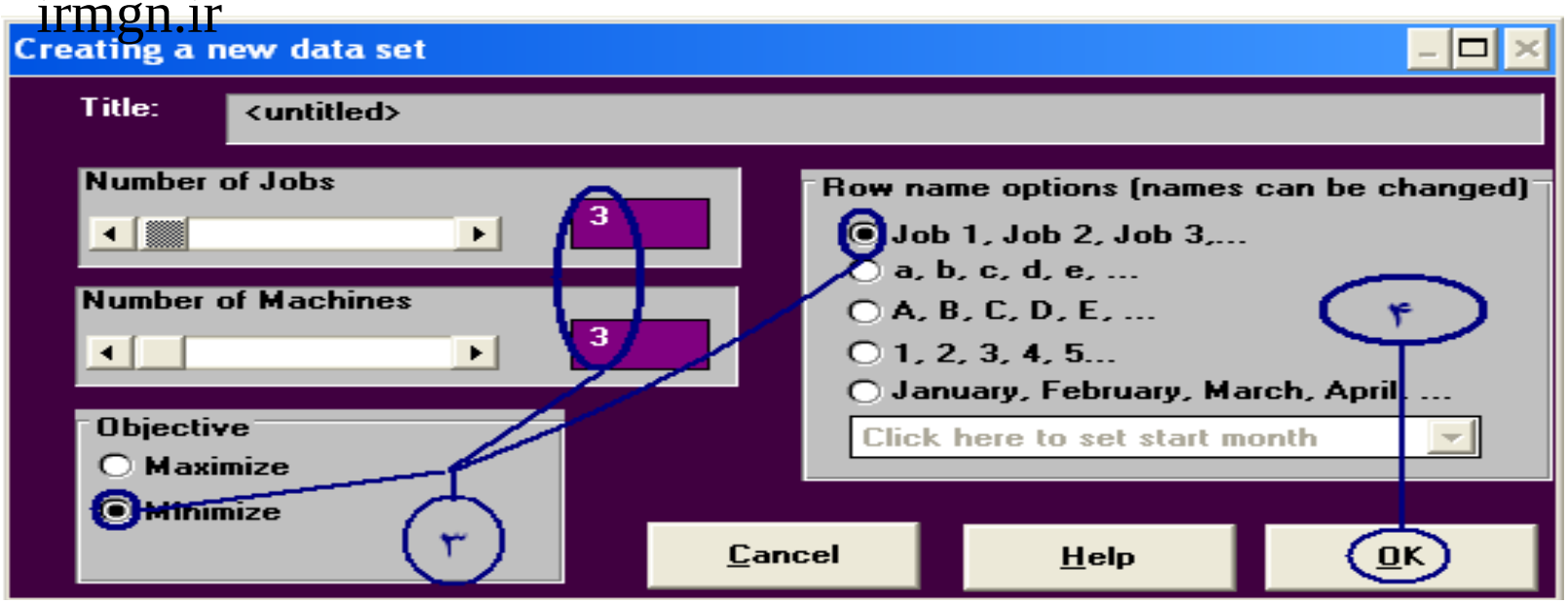
جواب به روش مجارستانی

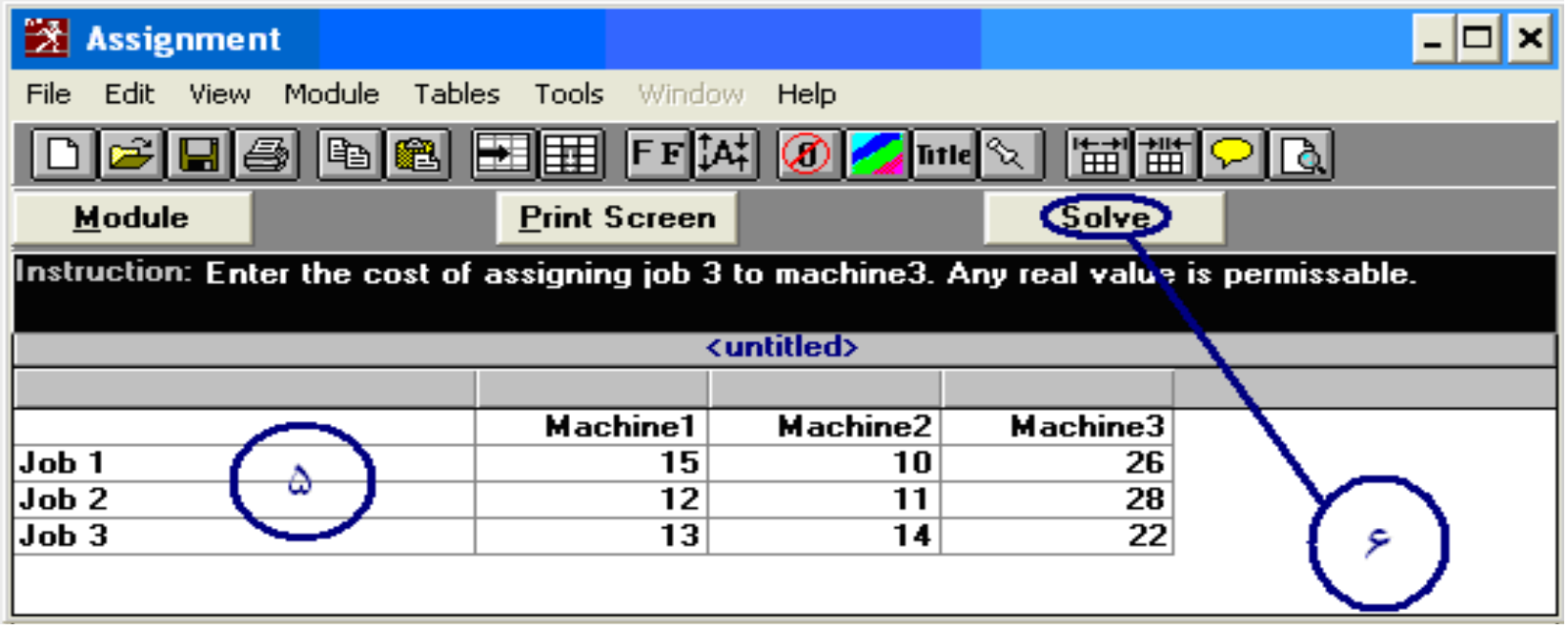
4- ***assignment list*** :

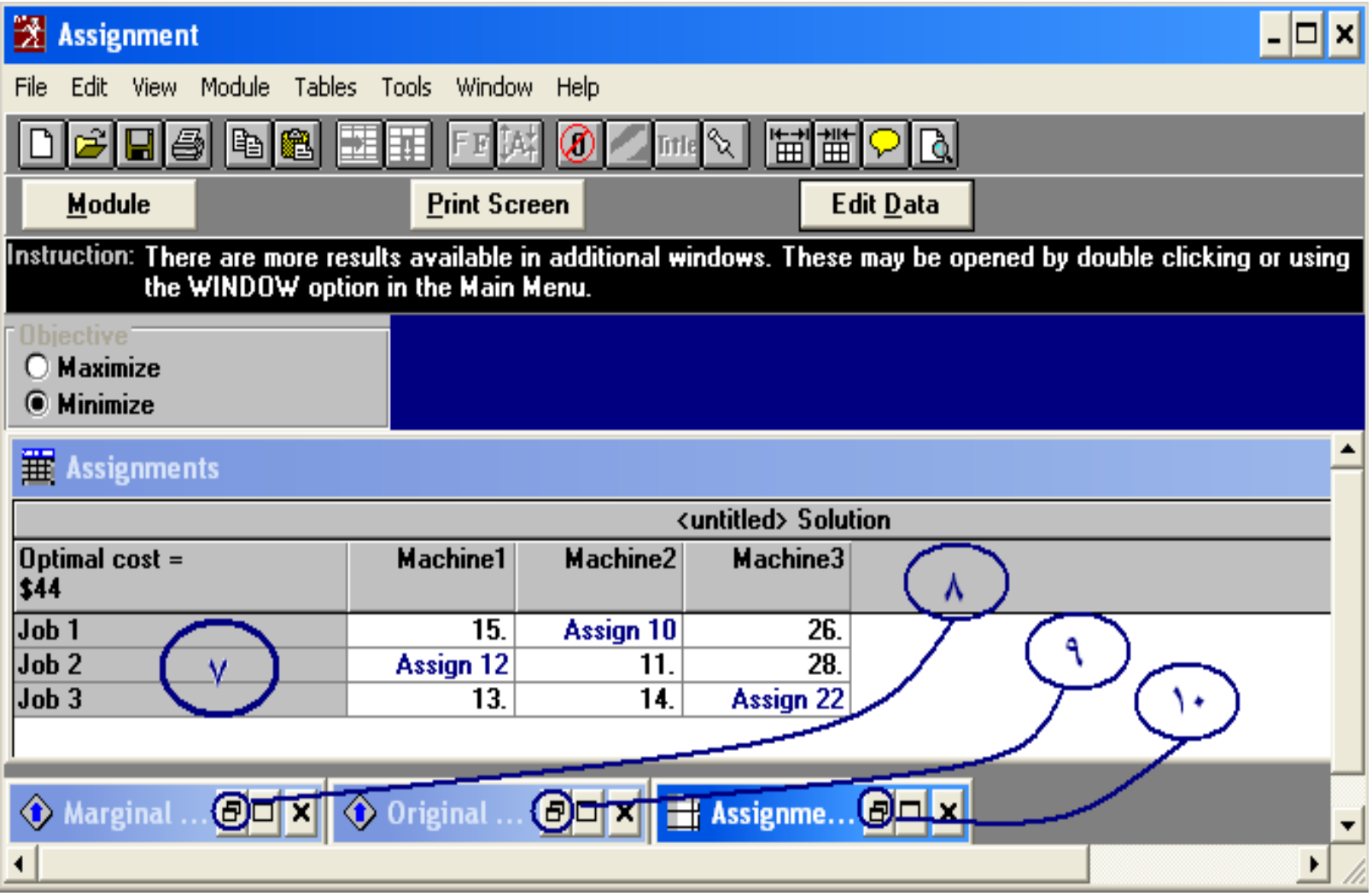
تخصیص بهینه به صورت جدولی را نشان می دهد


Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
Modules
POM and QM
Assignment
Breakeven/Cost-Volume Analy
Decision Analysis
Forecasting
Inventory
Linear Programming
Material Requirements Plannin
Project Management (PERT/C
Quality Control
Simulation
Transportation
Waiting Lines
POM Only
Aggregate Planning
Balancing, Assembly Line
Learning curves
Location
Lot Sizing
Job Shop Scheduling
Operations Layout
Reliability
QM Only
Game Theory
Goal Programming
Integer Programming
Markov Analysis
Mixed Integer Programming
Networks
Cancel


Assignment
File
Edit
View
Module
Tables
Tools
Window
Help
New
Open Ctrl+O
Close
Save Ctrl+S
Save As
Print Ctrl+P
Print Screen
Solve F9
Step
Exit
Exit Results
Print Screen
Solve
rom the menu bar and either create a NEW file or OPEN an already
۲


Creating a new data set
Title:
<untitled>
Number of Jobs
3
Number of Machines
3
Objective
Maximize
Minimize
Row name options (names can be changed)
Job 1, Job 2, Job 3,...
a, b, c, d, e, ...
A, B, C, D, E, ...
1, 2, 3, 4, 5...
January, February, March, April, ...
Click here to set start month
Cancel
Help
OK
۳
۴


Assignment
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
Instruction: Enter the cost of assigning job 3 to machine3. Any real value is permissable.
<untitled>
Machine1 Machine2 Machine3
Job 1 15 10 26
Job 2 12 11 28
Job 3 13 14 22
۵
۶


Assignment
File Edit View Module Tables Tools Window Help
Module
Print Screen
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Assignments
<untitled> Solution
Optimal cost = $44
Machine1
Machine2
Machine3
Job 1
15.
Assign 10
26.
Job 2
Assign 12
11.
28.
Job 3
13.
14.
Assign 22
Marginal ...
Original ...
Assignme...
۷
۸
۹
۱۰

Assignment

File Edit View Module Tables Tools Window Help

Module | Print Screen | Edit Data

Assignment List

<untitled> Solution

JOB	Assigned to	Cost
Job 1	Machine2	10.
Job 2	Machine1	12.
Job 3	Machine3	22.
Total		44.

۱۰

Assignment

File Edit View Module Tables Tools Window Help

Marginal Costs

<untitled> Solution

	Machine1	Machine2	Machine3
Job 1			
Job 2		4.	5.
Job 3	2.	8.	

۸

:(*Breakeven/cost-volume analysis*) :2-1

(نقطه سر به سر):نقطه ای است که در آن میزان سود وزیان شرکت برابر خواهد بود بدین معنی که در این نقطه نه سود حاصل می شود نه زیان محاسبه مقدار تولید در نقطه سر به سر:

$$Q = \frac{F}{P-V}$$

در الگوریتم حل ***DS که در New*** منوی ***File*** ' این مدل مشاهده خواهیم کرد 2نوع تحلیل حساسیت

خواهیم یافت

Cost-volume Analysis -1

مقایسه حداکثر 3 کالا با هزینه متفاوت تولید برای دستیابی به نقطه سربه سر

Breakeven Analysis (cost Vs Revenue)-2

نقطه سربه سر فقط یک کالا

Cost-volume Analysis

بااجرای نرم افزار پنجره امodules بازمی شود و از داخل آن گزینه

Breakeven/ cost- volume Analyzez را انتخاب نموده و سپس از داخل منوی ***File***

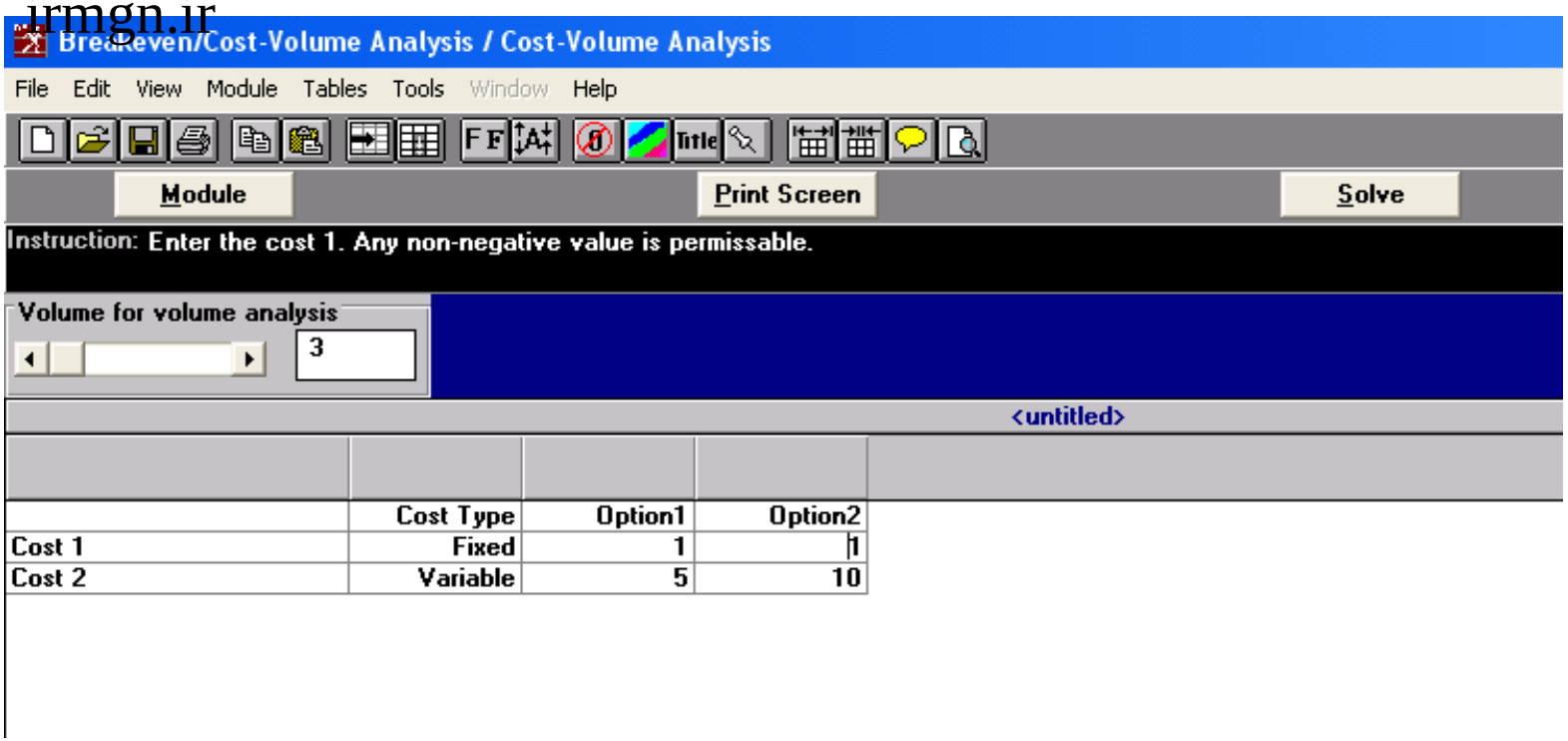
گزینه***Analysisnew*** را انتخاب نموده که در جدولی باز می شود واز داخل آن گزینه

Cost-volume را انتخاب که با انجام این کار جدول ***Creating a new data set***

باز می شود در این باکس با انتخاب تعداد کالاهای مورد مقهیسه که تعداد آن حداکثر 3 می تواند باشد و هم چنین تعداد هزینه های مورد بحث برای هر کالا با زدن گزینه ***ok***واردمحیط وارد کردن مساله

می شویم که در آن به ترتیب تعداد تولید-هزینه ثابت و هزینه متغیر را وارد نموده و با زدن گزینه

به حل مساله می پردازیم. ودر با انتخاب تعداد تولید که بر هزینه های متغیر تاثیر دارد در حل مساله ***Solve***با مفاهیم هزینه کل ثابت وهزینه کل متغیر نیز مواجه می شویم


Breakeven/Cost-Volume Analysis / Cost-Volume Analysis
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
Instruction: Enter the cost 1. Any non-negative value is permissable.
Volume for volume analysis
3
<untitled>
Cost Type Option1 Option2
Cost 1 Fixed 1 1
Cost 2 Variable 5 10

Breakeven/Cost-Volume Analysis / Cost-Volume Analysis

File Graphs Background Window Help

Module | Print Screen | Edit Data

Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.

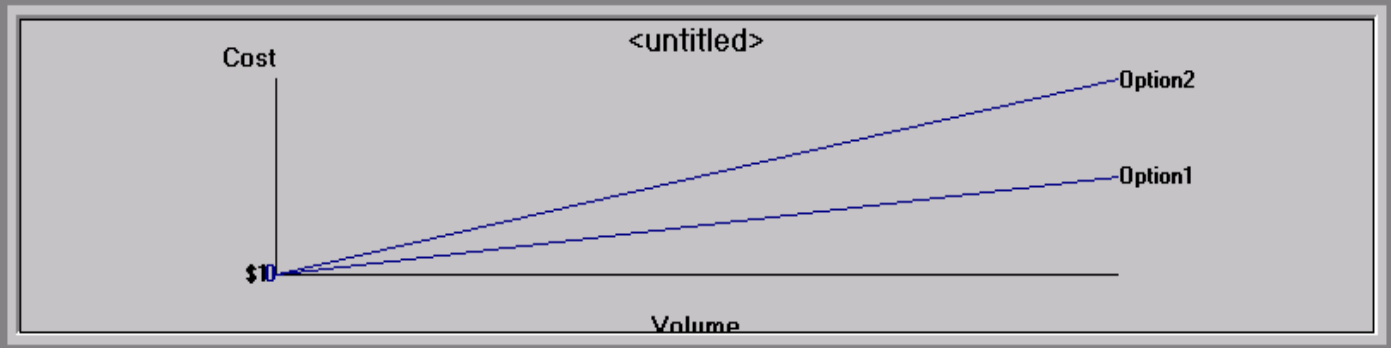
Volume for volume analysis: 3

Breakeven/Cost-Volume Analysis Results

<untitled> Solution

	Cost Type	Option1	Option2
Cost 1	Fixed	1.	1.
Cost 2	Variable	5.	10.
BREAKEVEN POINTS	Units	Dollars	
Option1 vs Option2	0.	1.	
Volume analysis @	3.		
Total Fixed Costs		1.	1.
Total Variable Costs		15.	30.
Total Costs		16.	31.

Graph of Breakeven Analysis



Breakeven Analysis (cost Vs Revenue) -2

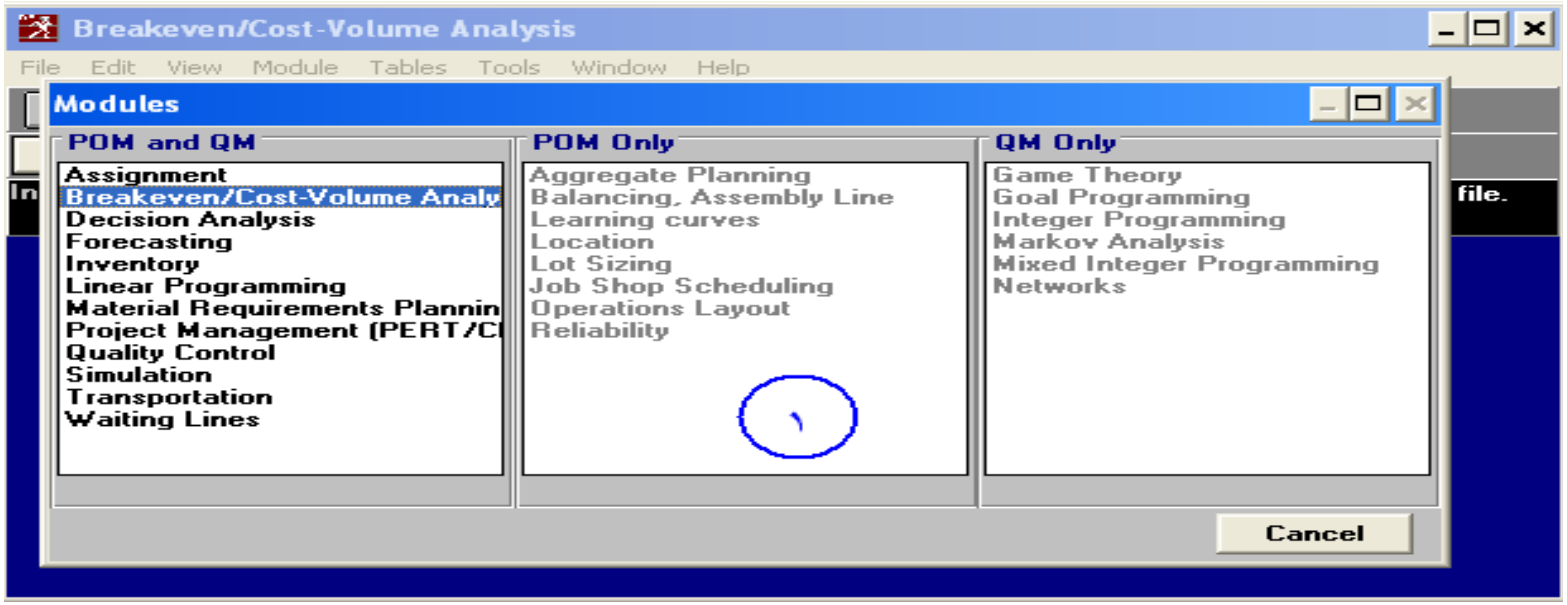
بااجرای نرم افزار پنجره ایmodules بازمی شود و از داخل آن گزینه

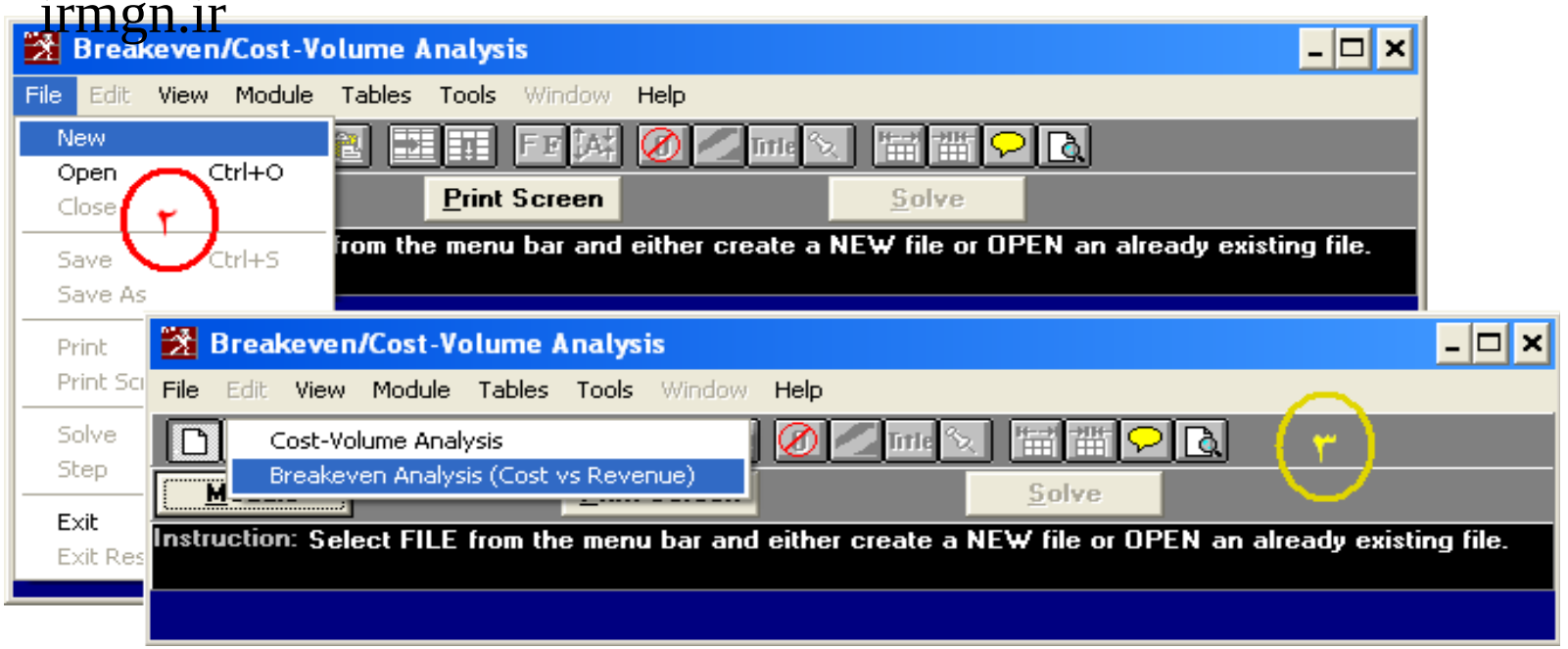
Breakeven/ cost- volume Analyzez را انتخاب نموده و سپس از داخل منوی ***File***

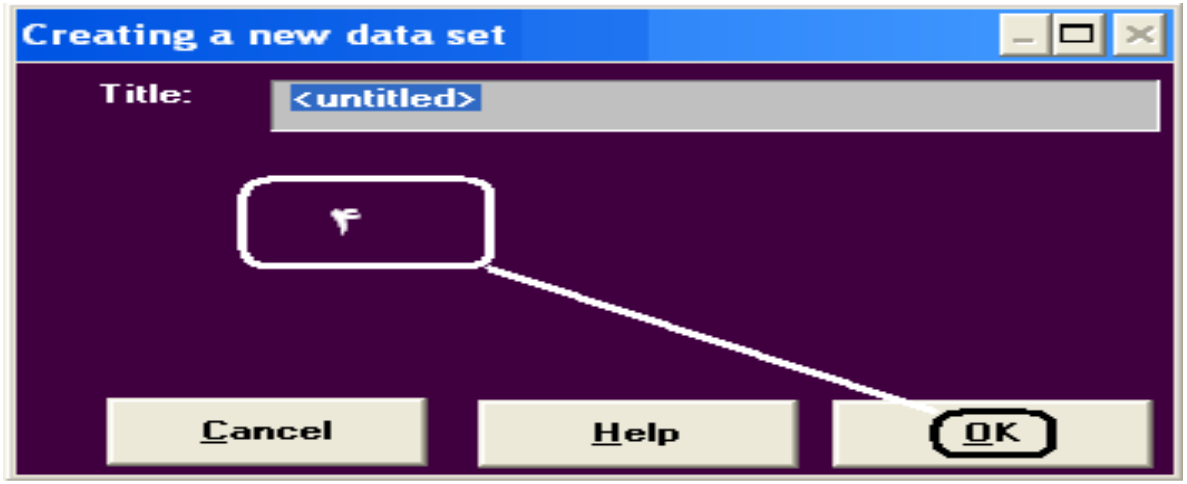
new را انتخاب کرده که جدولی باز می شود و از داخل آن گزینه

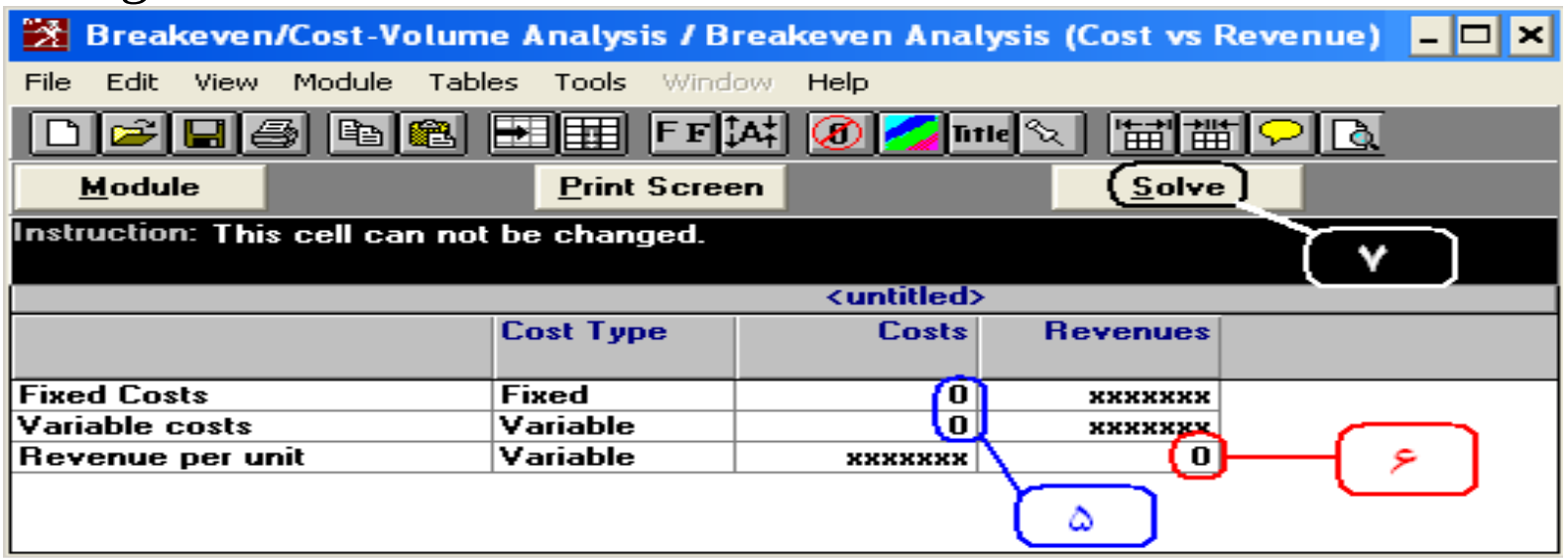
Breakeven Analysis (cost Vs Revenue) را انتخاب کرده و سپس جدول

Creating a new data set باز می شود و با انتخاب گزینه ***Ok*** جدول حل نمایان میگردد




Breakeven/Cost-Volume Analysis
File Edit View Module Tables Tools Window Help
New
Open Ctrl+O
Close
Save Ctrl+S
Save As
Print
Print Scr
Solve
Step
Exit
Exit Res
۲
Print Screen
Solve
rom the menu bar and either create a NEW file or OPEN an already existing file.
Breakeven/Cost-Volume Analysis
File Edit View Module Tables Tools Window Help
Cost-Volume Analysis
Breakeven Analysis (Cost vs Revenue)
۳
Solve
Instruction: Select FILE from the menu bar and either create a NEW file or OPEN an already existing file.


Creating a new data set
Title:
<untitled>
۴
Cancel
Help
OK



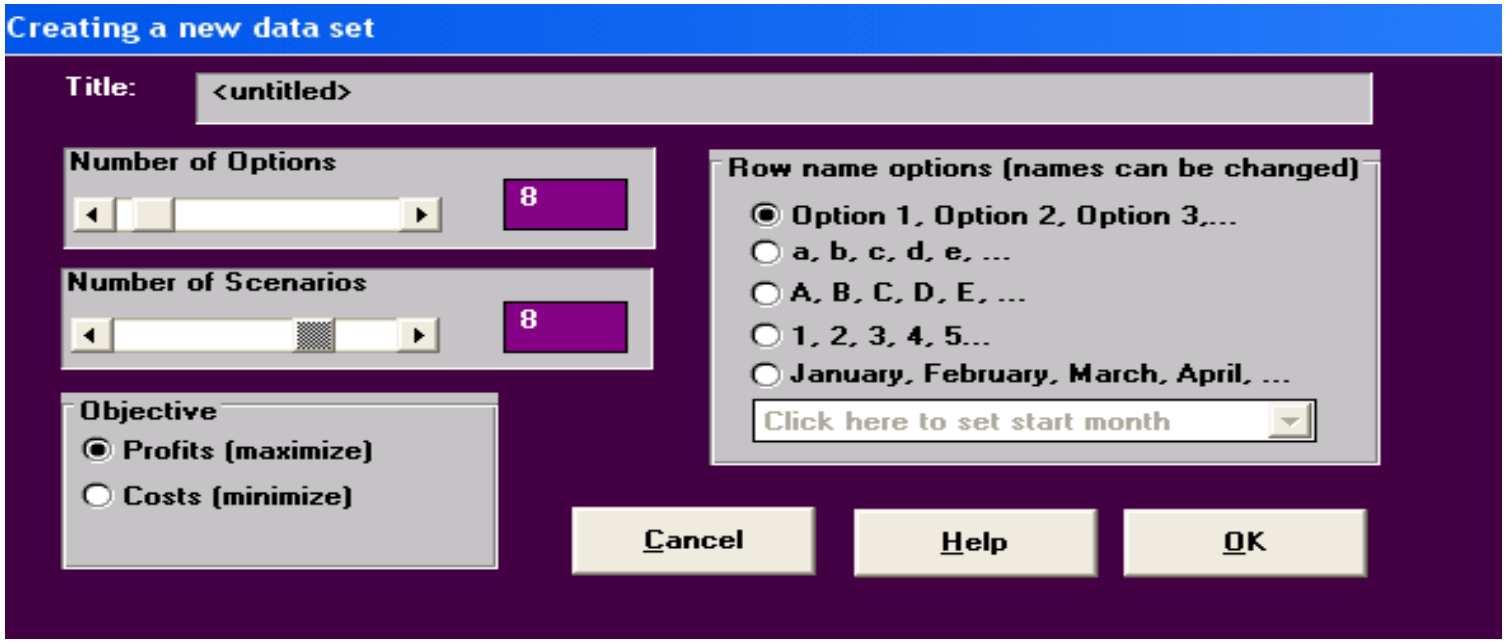
که در آن هزینه ثابت و متغیر و قیمت را وارد کرده و گزینه ***Solve*** را انتخاب می کنیم و

برای نمایش نمودار آن پنجره ***Graph*** را باز می کنیم

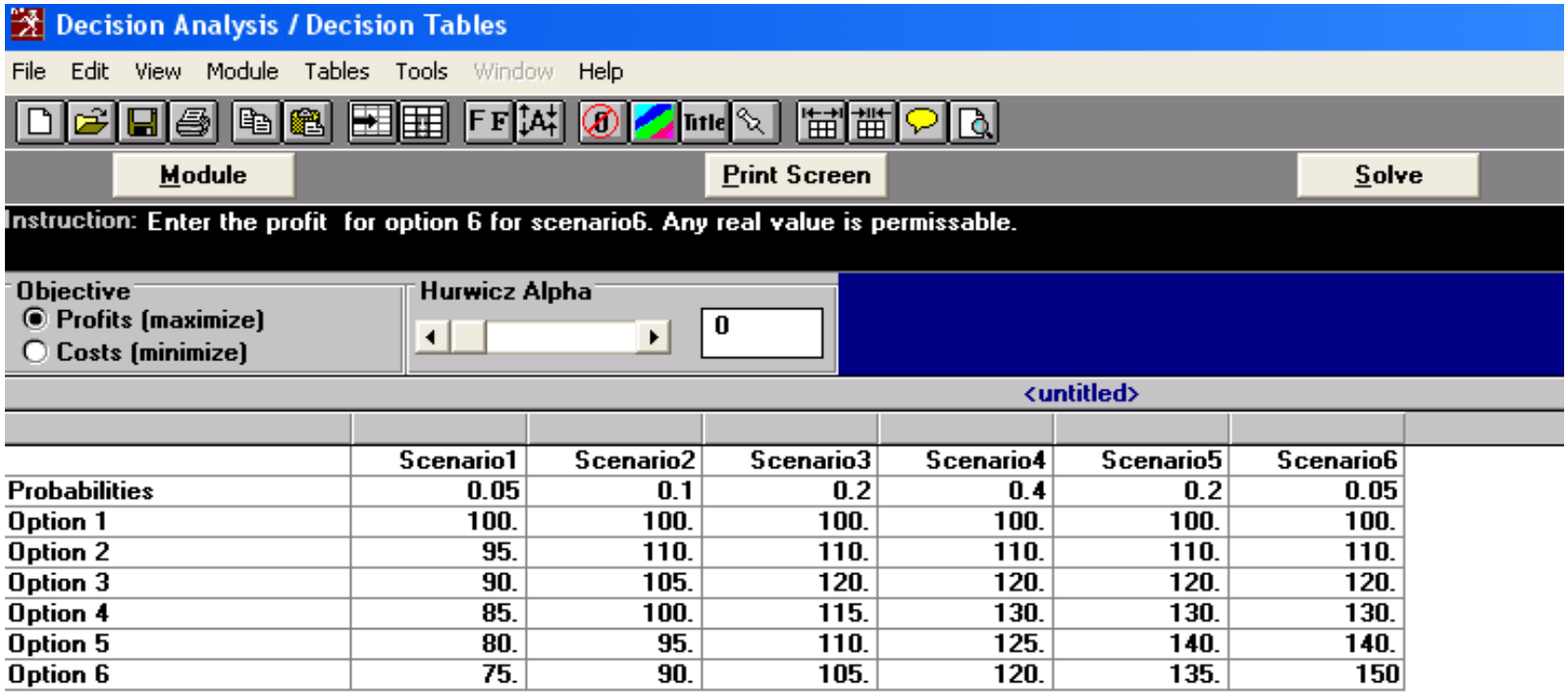
3-1: (*Decision Analysis*) تصمیم گیری در مدیریت

ابتدا با وارد کردن تعداد Options(در اینجا دورههای فروش) و scenarios(تعداد احتمالات دورهها)

وارد مرحله اول می شویم:



مرحله اول:صفحه ورودی داده ها :در این صفحه ماتریس تصمیم گیری وارد خواهد شد:



	Scenario1	Scenario2	Scenario3	Scenario4	Scenario5	Scenario6
Probabilities	0.05	0.1	0.2	0.4	0.2	0.05
Option 1	100.	100.	100.	100.	100.	100.
Option 2	95.	110.	110.	110.	110.	110.
Option 3	90.	105.	120.	120.	120.	120.
Option 4	85.	100.	115.	130.	130.	130.
Option 5	80.	95.	110.	125.	140.	140.
Option 6	75.	90.	105.	120.	135.	150

مرحله دوم:جدول نتایج:

Decision table results-1:ارزش مورد انتظار

Decision Analysis / Decision Tables

File Edit View Module Tables Tools Window Help

Module | Print Screen | Solve

Instruction: Enter the profit for option 6 for scenario6. Any real value is permissable.

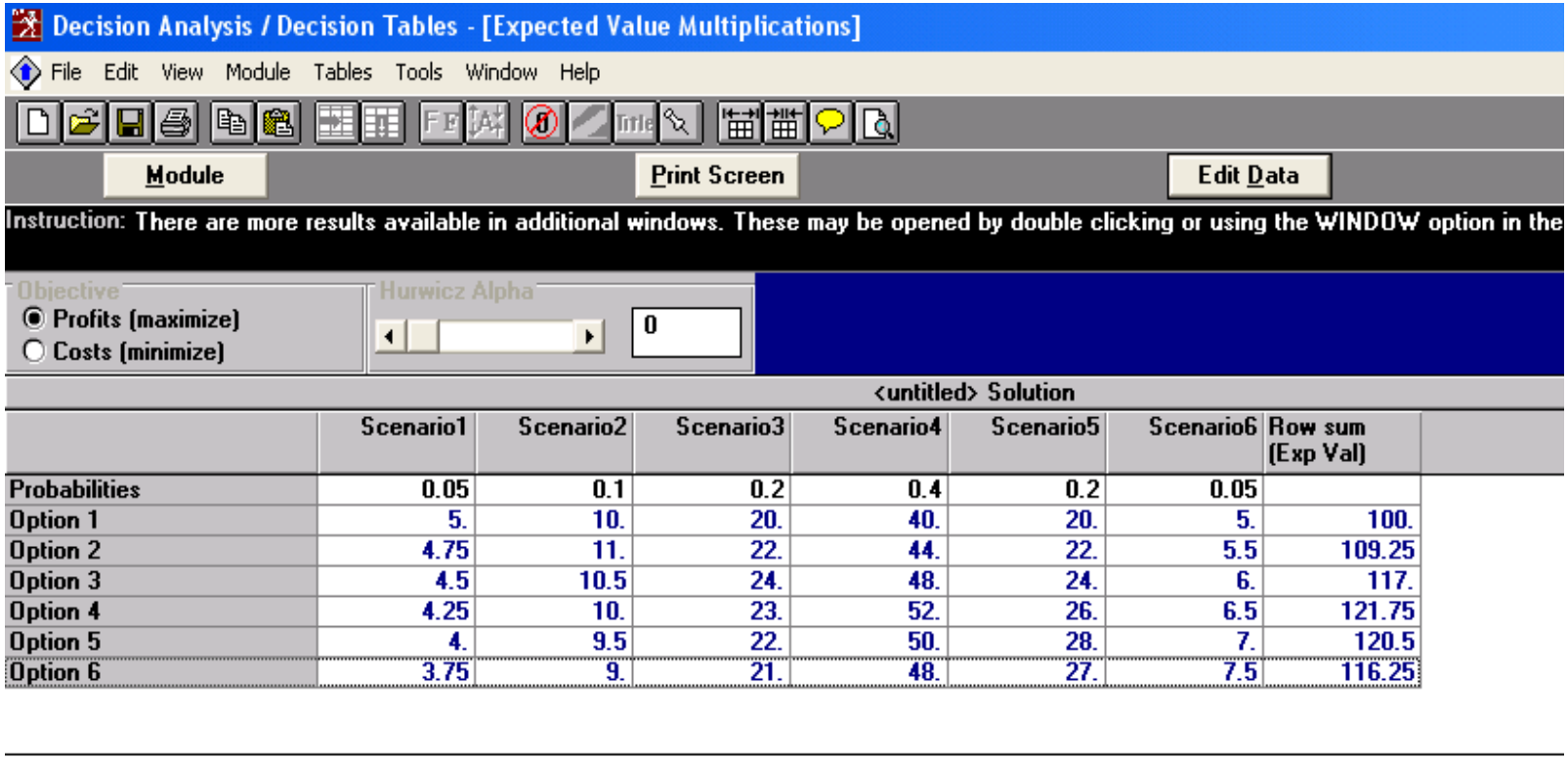
Objective
- (•) Profits (maximize)
- ( ) Costs (minimize)

Hurwicz Alpha: 0

<untitled>

	Scenario1	Scenario2	Scenario3	Scenario4	Scenario5	Scenario6
Probabilities	0.05	0.1	0.2	0.4	0.2	0.05
Option 1	100.	100.	100.	100.	100.	100.
Option 2	95.	110.	110.	110.	110.	110.
Option 3	90.	105.	120.	120.	120.	120.
Option 4	85.	100.	115.	130.	130.	130.
Option 5	80.	95.	110.	125.	140.	140.
Option 6	75.	90.	105.	120.	135.	150

ضرایب امید ریاضی :*Expected value multiplications -2*



	Scenario1	Scenario2	Scenario3	Scenario4	Scenario5	Scenario6	Row sum (Exp Val)
Probabilities	0.05	0.1	0.2	0.4	0.2	0.05	
Option 1	5.	10.	20.	40.	20.	5.	100.
Option 2	4.75	11.	22.	44.	22.	5.5	109.25
Option 3	4.5	10.5	24.	48.	24.	6.	117.
Option 4	4.25	10.	23.	52.	26.	6.5	121.75
Option 5	4.	9.5	22.	50.	28.	7.	120.5
Option 6	3.75	9.	21.	48.	27.	7.5	116.25

3- Perfect information: اطلاعات کامل

Decision Analysis / Decision Tables - [Perfect Information]

File Edit View Module Tables Tools Window Help

Module | Print Screen | Edit Data

Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Mai

Objective: (•) Profits (maximize) ( ) Costs (minimize)

Hurwicz Alpha: 0

<untitled> Solution

	Scenario1	Scenario2	Scenario3	Scenario4	Scenario5	Scenario6	Maximum
Probabilities	0.05	0.1	0.2	0.4	0.2	0.05	
Option 1	100.	100.	100.	100.	100.	100.	
Option 2	95.	110.	110.	110.	110.	110.	
Option 3	90.	105.	120.	120.	120.	120.	
Option 4	85.	100.	115.	130.	130.	130.	
Option 5	80.	95.	110.	125.	140.	140.	
Option 6	75.	90.	105.	120.	135.	150.	
Perfect Information	100.	110.	120.	130.	140.	150.	
Perfect*probability	5.	11.	24.	52.	28.	7.5	127.5
Best Expected Value							121.75
Exp Value of Perfect Info							5.75

4- Regret or opportunity loss: فرصت از دست رفته

Decision Analysis / Decision Tables - [Regret or Opportunity Loss]

File Edit View Module Tables Tools Window Help

Module | Print Screen | Edit Data

Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW optio

Objective
- (•) Profits (maximize)
- ( ) Costs (minimize)

Hurwicz Alpha: 0

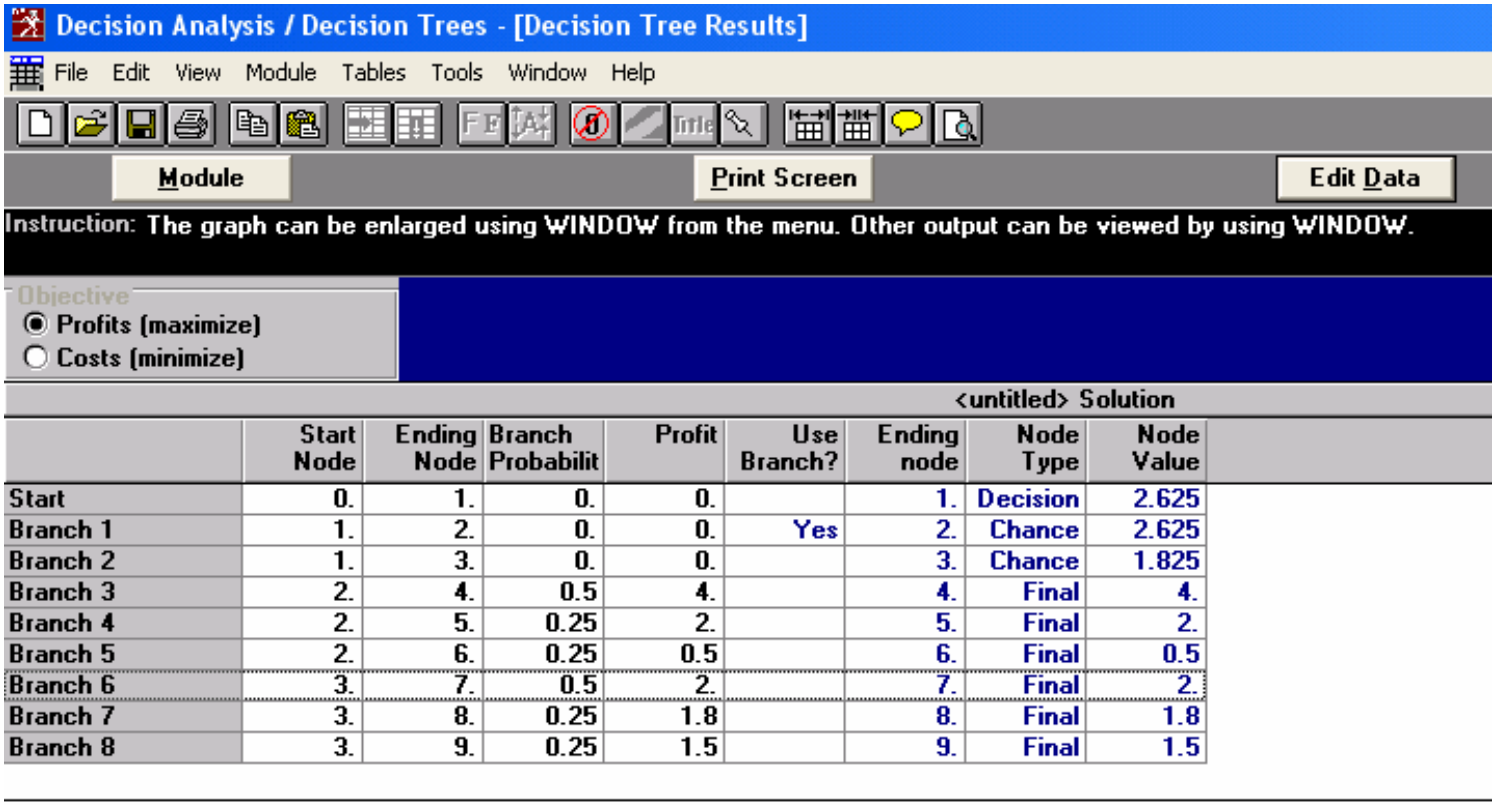
<untitled> Solution

	Scenario1 Regret	Scenario2 Regret	Scenario3 Regret	Scenario4 Regret	Scenario5 Regret	Scenario6 Regret	Maximum Regret
Probabilities	0.05	0.1	0.2	0.4	0.2	0.05	
Option 1	0.	10.	20.	30.	40.	50.	50.
Option 2	5.	0.	10.	20.	30.	40.	40.
Option 3	10.	5.	0.	10.	20.	30.	30.
Option 4	15.	10.	5.	0.	10.	20.	20.
Option 5	20.	15.	10.	5.	0.	10.	20.
Option 6	25.	20.	15.	10.	5.	0.	25.
Minimax regret							20.

2-زیر مدل دوم: **Decision trees**

بعد از مشخص کردن شاخه ها در صفحه آغازین حل این مدل دارای دو زیر پنجره با نامهای :

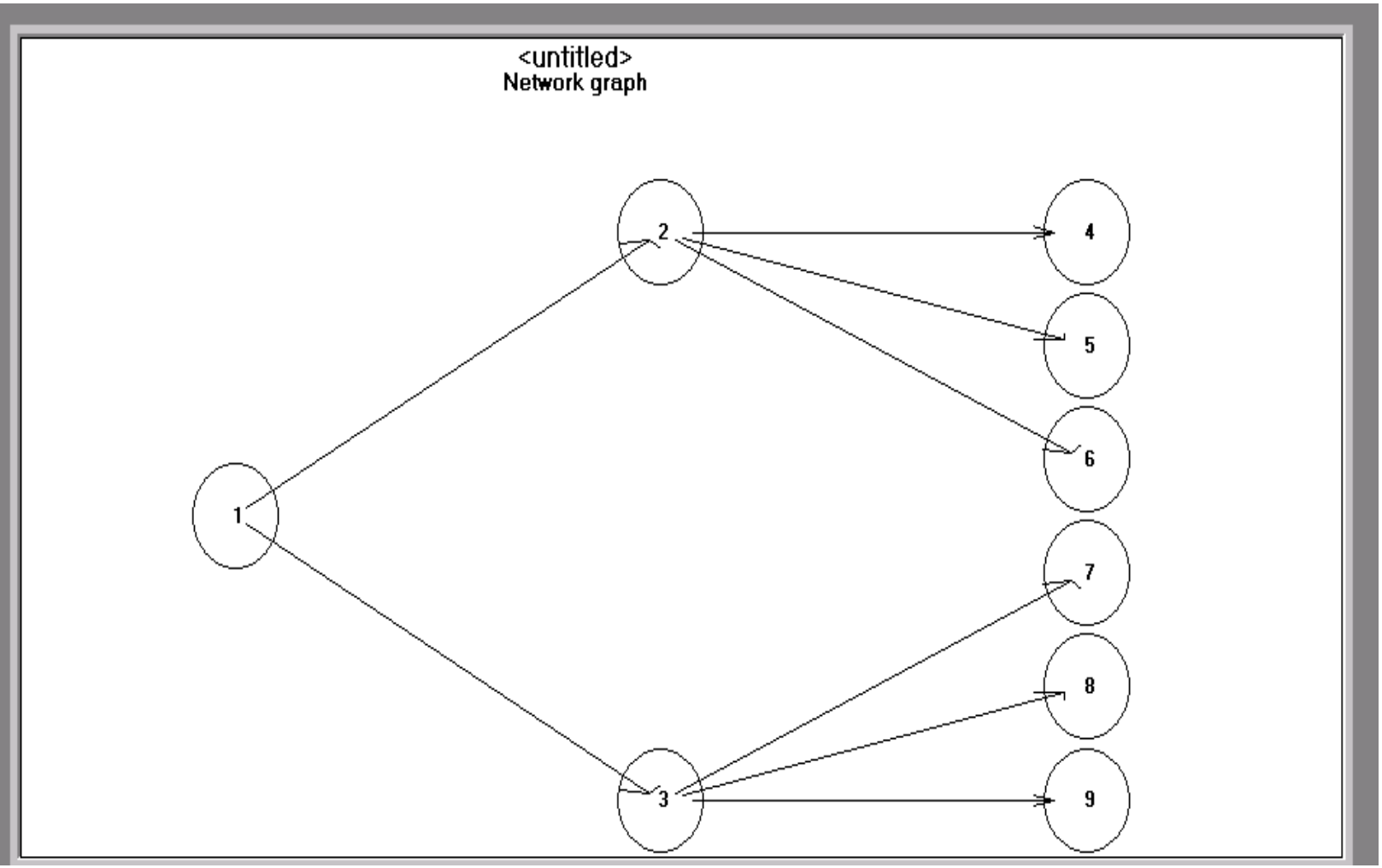
Decision tree results-1 تعداد استراتژی ها و سود مورد انتظار هر استراتژی



<untitled> Solution

	Start Node	Ending Node	Branch Probabilit	Profit	Use Branch?	Ending node	Node Type	Node Value
Start	0.	1.	0.	0.		1.	Decision	2.625
Branch 1	1.	2.	0.	0.	Yes	2.	Chance	2.625
Branch 2	1.	3.	0.	0.		3.	Chance	1.825
Branch 3	2.	4.	0.5	4.		4.	Final	4.
Branch 4	2.	5.	0.25	2.		5.	Final	2.
Branch 5	2.	6.	0.25	0.5		6.	Final	0.5
Branch 6	3.	7.	0.5	2.		7.	Final	2.
Branch 7	3.	8.	0.25	1.8		8.	Final	1.8
Branch 8	3.	9.	0.25	1.5		9.	Final	1.5

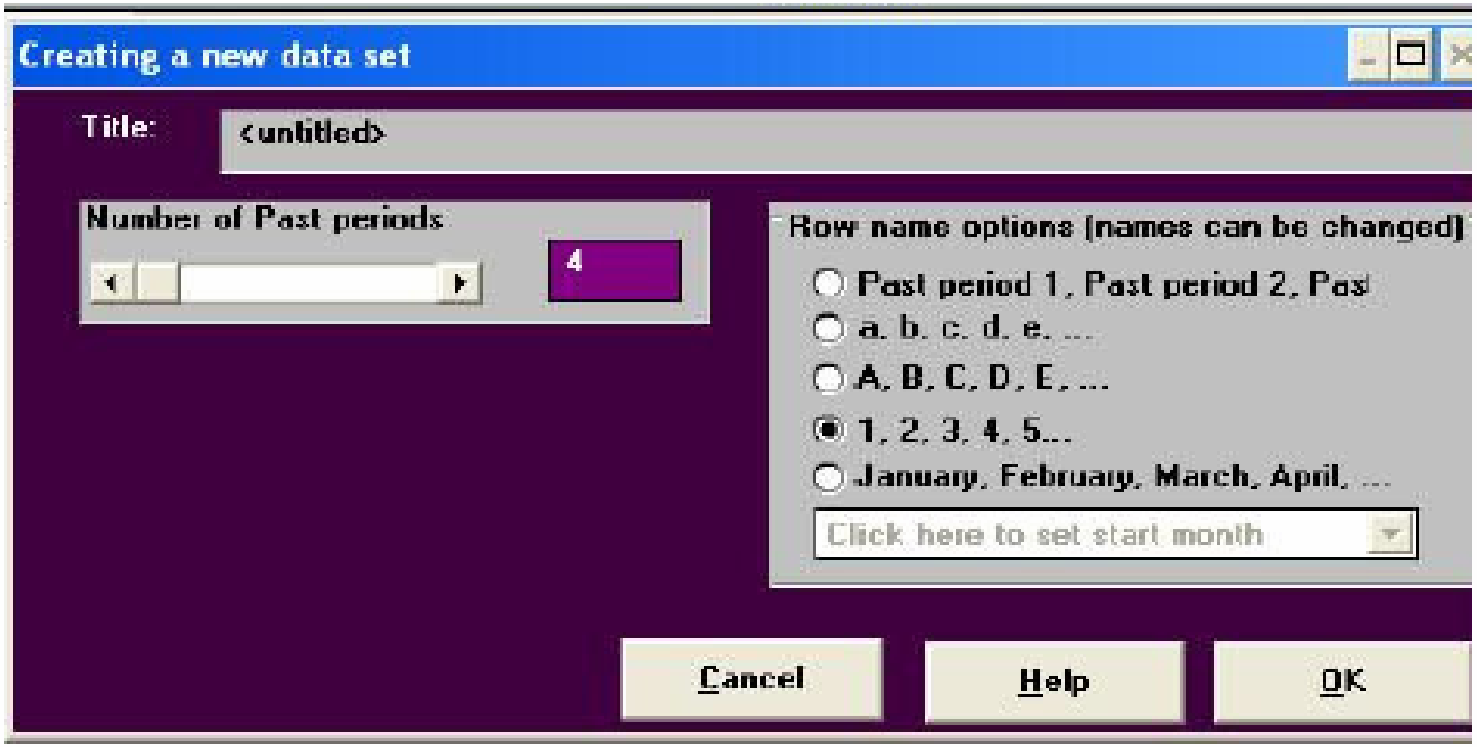
Tree structure -2 : ساختار درختی برای هر استراتژی به صورت گرافیکی

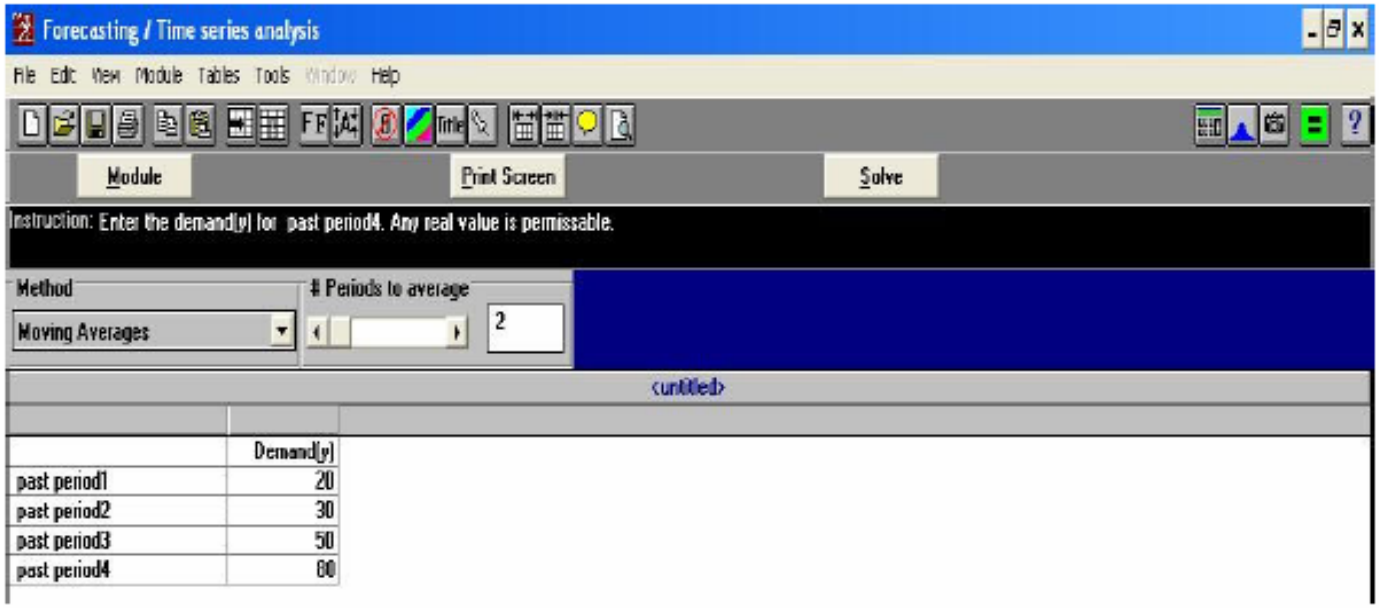


4-1: (*Forecasting*) پیش بینی و رگرسیون

فرآیند پیش بینی جزیی از فرآیند کلی مدیریت تولید و برنامه ریزی می باشد.در برنامه ریزی و کنترل تولید وموجودی ها پیش بینی عامل مهمی می باشد.

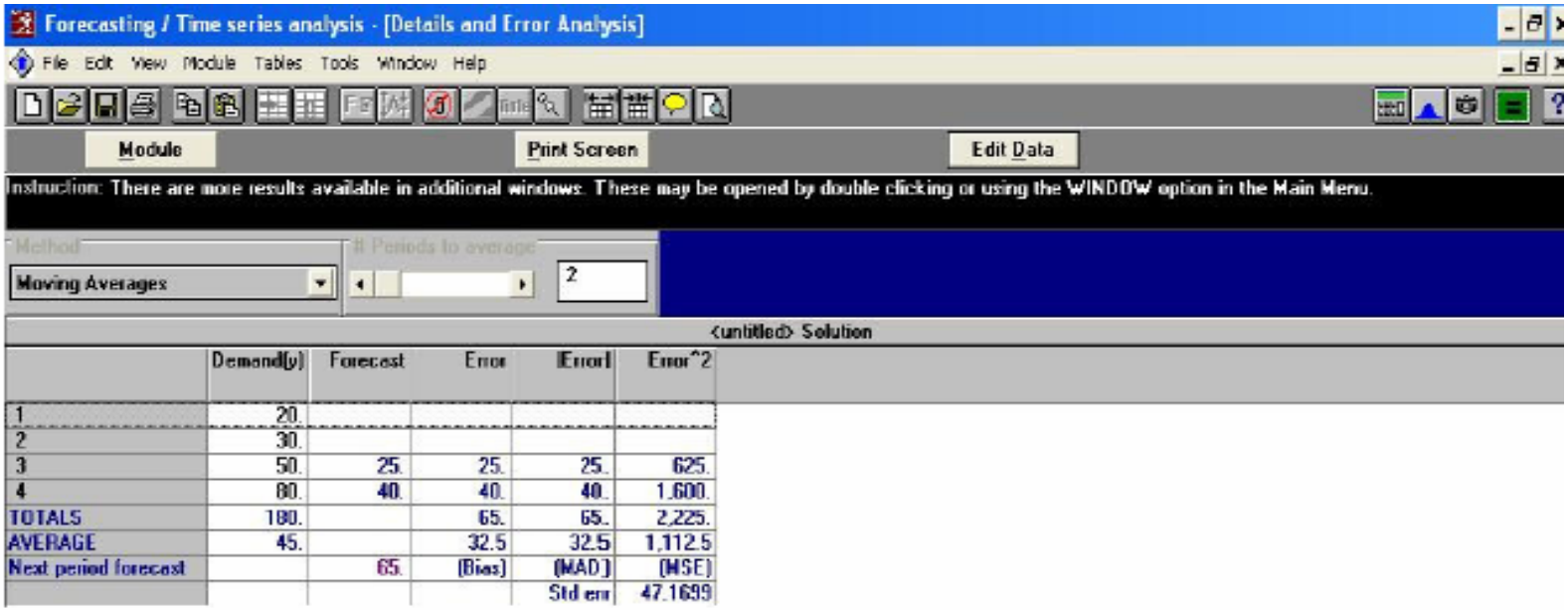
بعد از ورود در محیط DS گزینه Forecasting را انتخاب کرده و سپس از گزینه File، New را انتخاب کرده و سپس Time Series analysis را انتخاب می کنیم.



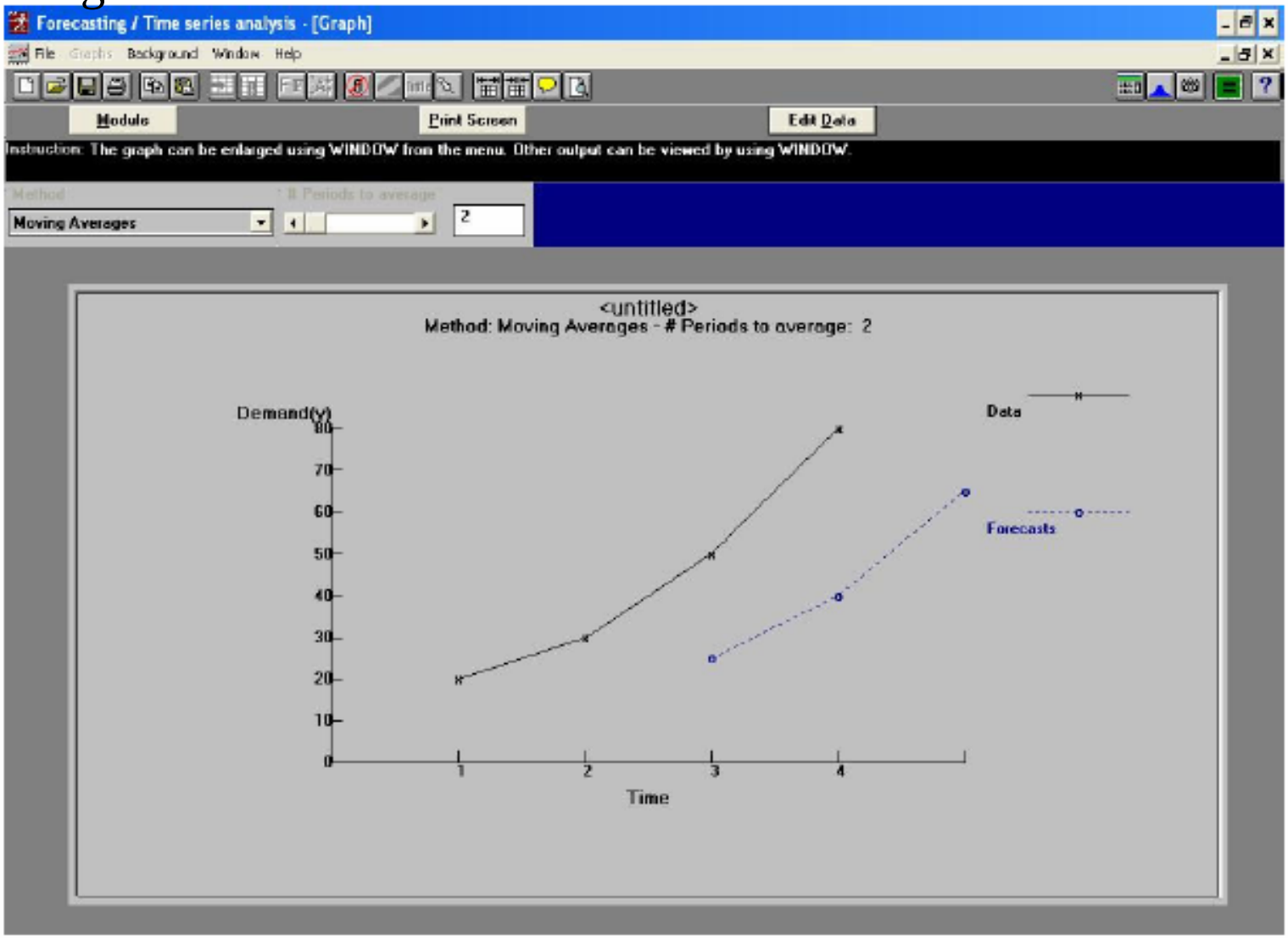


از فروریز Method انواع تکنیک های Forecasting را انتخاب کنید.
اولین روش را انتخاب کرده که Moving average می باشد.

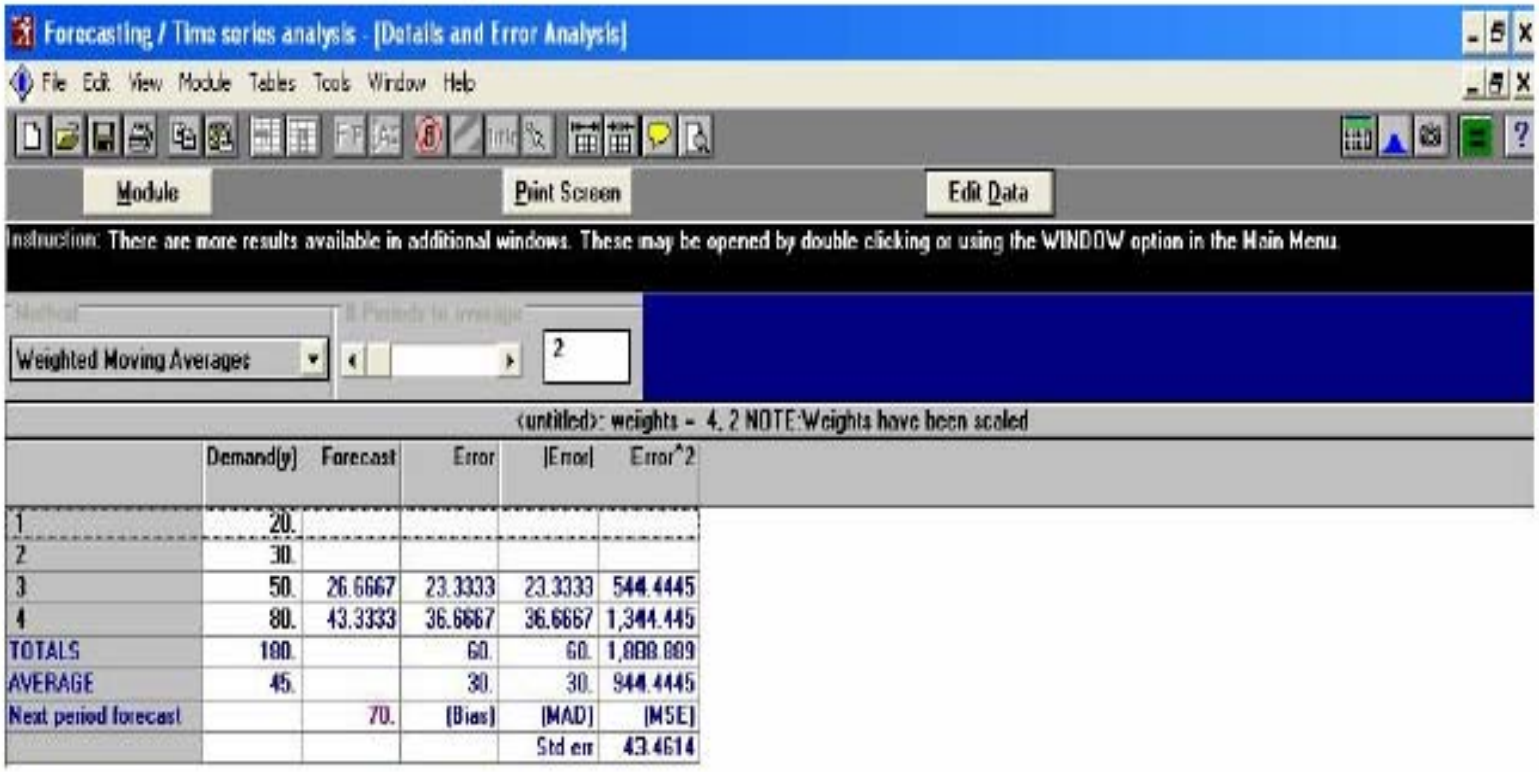
اطلاعات که شامل تعداد دوره ها برای میانگین می باشد را وارد می کنیم سپس گزینه Solveرا انتخاب کرده و از windows برای اطلاع از جزییات بیشتر استفاده می کنیم



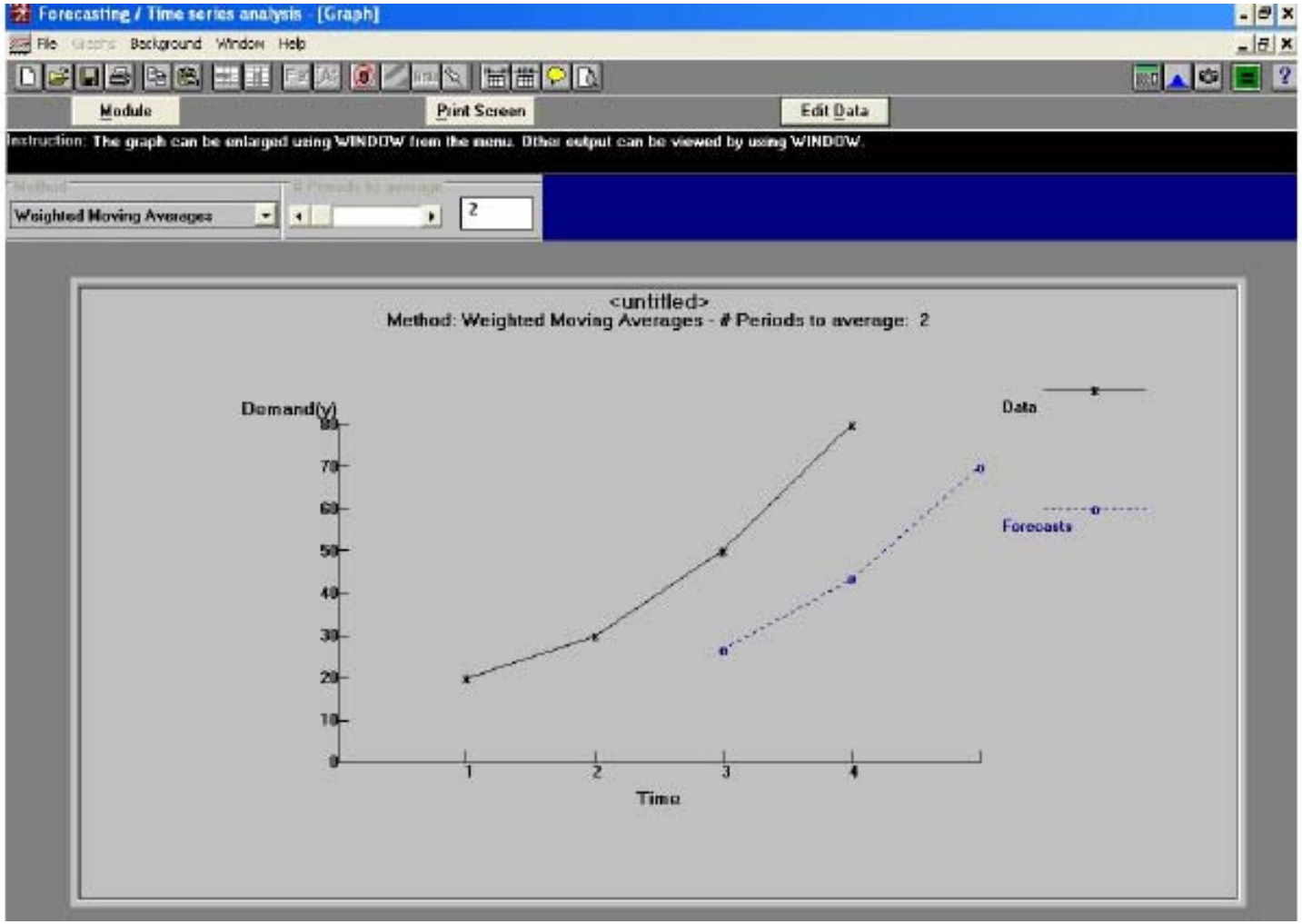
	Demand(y)	Forecast	Error	|Error|	Error^2
1	20.				
2	30.				
3	50.	25.	25.	25.	625.
4	80.	40.	40.	40.	1,600.
TOTALS	180.		65.	65.	2,225.
AVERAGE	45.		32.5	32.5	1,112.5
Next period forecast		65.	(Bias)	(MAD)	(MSE)
				Std err	47.1699


Forecasting / Time series analysis - [Graph]
File Graphs Background Window Help
Module
Print Screen
Edit Data
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.
Method
Periods to average
Moving Averages
2
<untitled>
Method: Moving Averages - # Periods to average: 2
Demand(Y)
80
70
60
50
40
30
20
10
0
1
2
3
4
Time
Data
Forecasts

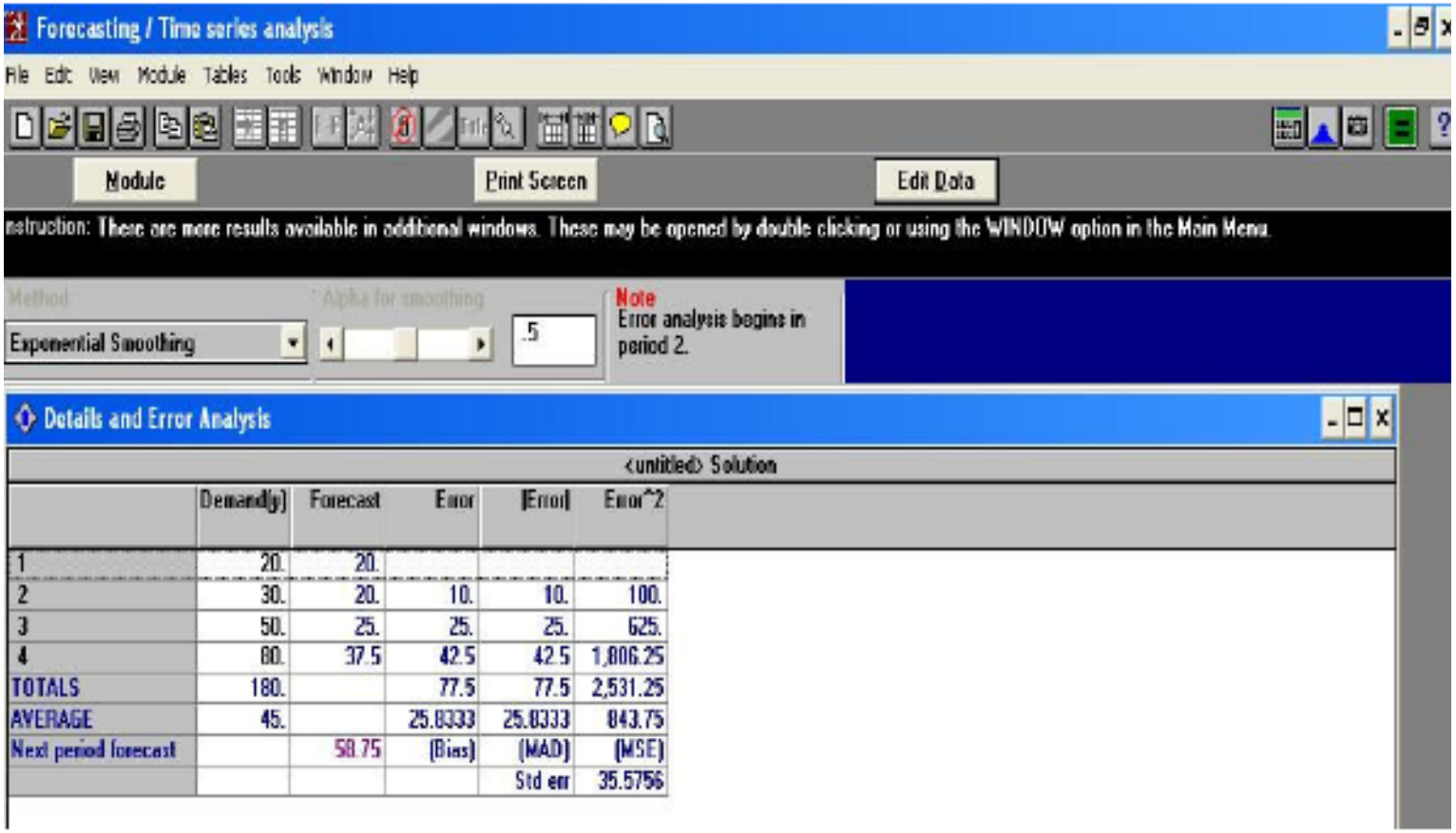
از فروریز Methodدومین روش را انتخاب کرده و وزنی برای دوره میانگین ها وارد کرده و سپس گزینه Solveرا می زنیم و از windows برای اطلاع از جزییات بیشتر استفاده می کنیم



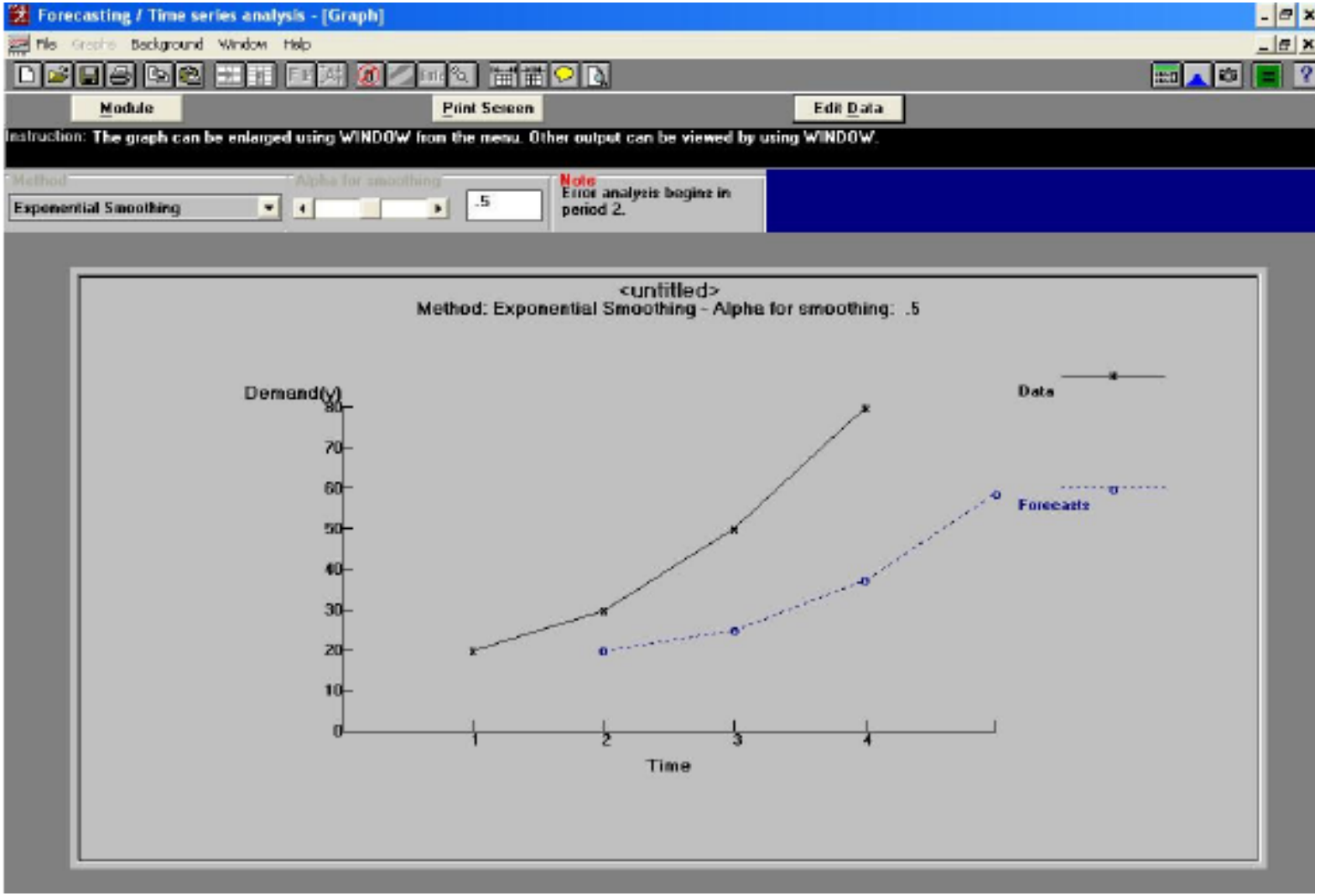
	Demand(y)	Forecast	Error	|Error|	Error^2
1	20.				
2	30.				
3	50.	26.6667	23.3333	23.3333	544.4445
4	80.	43.3333	36.6667	36.6667	1,344.445
TOTALS	180.		60.	60.	1,888.889
AVERAGE	45.		30.	30.	944.4445
Next period forecast		70.	(Bias)	(MAD)	(MSE)
				Std err	43.4614


Forecasting / Time series analysis - [Graph]
File Graphs Background Window Help
Module
Print Screen
Edit Data
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.
Weighted Moving Averages
2
<untitled>
Method: Weighted Moving Averages - # Periods to average: 2
Demand(y)
80
70
60
50
40
30
20
10
0
1
2
3
4
Time
Data
Forecasts

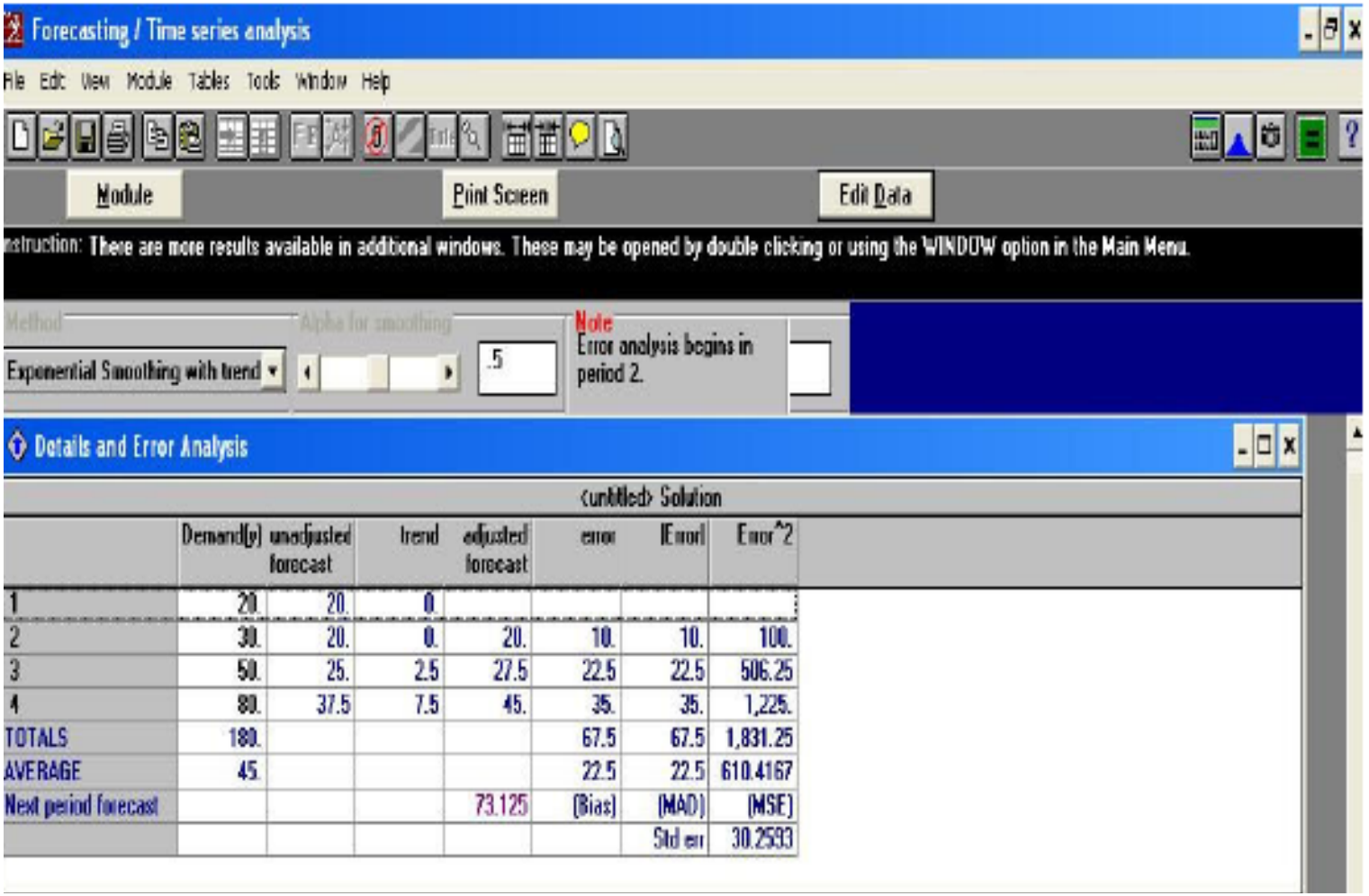
از فرو ریز Method سومین گزینه را انتخاب می کنیم و علاوه بر دوره ها برای میانگین مقدار a را در خواست می کنیم که از فرو ریز می توان آن را عوض کرد که مقدار آن باید بین 0و1 باشد که هر چه کوچکتر باشد ارزش بیشتری به شرایط تقاضا در گذشته داده و در نتیجه از نوسانات کاسته خواهد شد



	Demand(y)	Forecast	Error	|Error|	Error^2
1	20.	20.			
2	30.	20.	10.	10.	100.
3	50.	25.	25.	25.	625.
4	80.	37.5	42.5	42.5	1,806.25
TOTALS	180.		77.5	77.5	2,531.25
AVERAGE	45.		25.8333	25.8333	843.75
Next period forecast		58.75	(Bias)	(MAD)	(MSE)
				Std err	35.5756


Forecasting / Time series analysis - [Graph]
File Graphs Background Window Help
Module
Print Screen
Edit Data
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.
Method
Exponential Smoothing
Alpha for smoothing
.5
Note
Error analysis begins in period 2.
<untitled>
Method: Exponential Smoothing - Alpha for smoothing: .5
Demand(y)
80
70
60
50
40
30
20
10
0
1
2
3
4
Time
Data
Forecasts

از فرو ریز Method چهارمین گزینه را انتخاب کنید علاوه بر دوره ها مقدار aو B را در خواست کرده و مقدار اولیه ای برای Forecastو Trend وارد می کنیم



5-1: (***Inventory***): مدیریت کنترل موجودی

در DS 6 مدل مطرح است

Economic order quantity

production order quantity

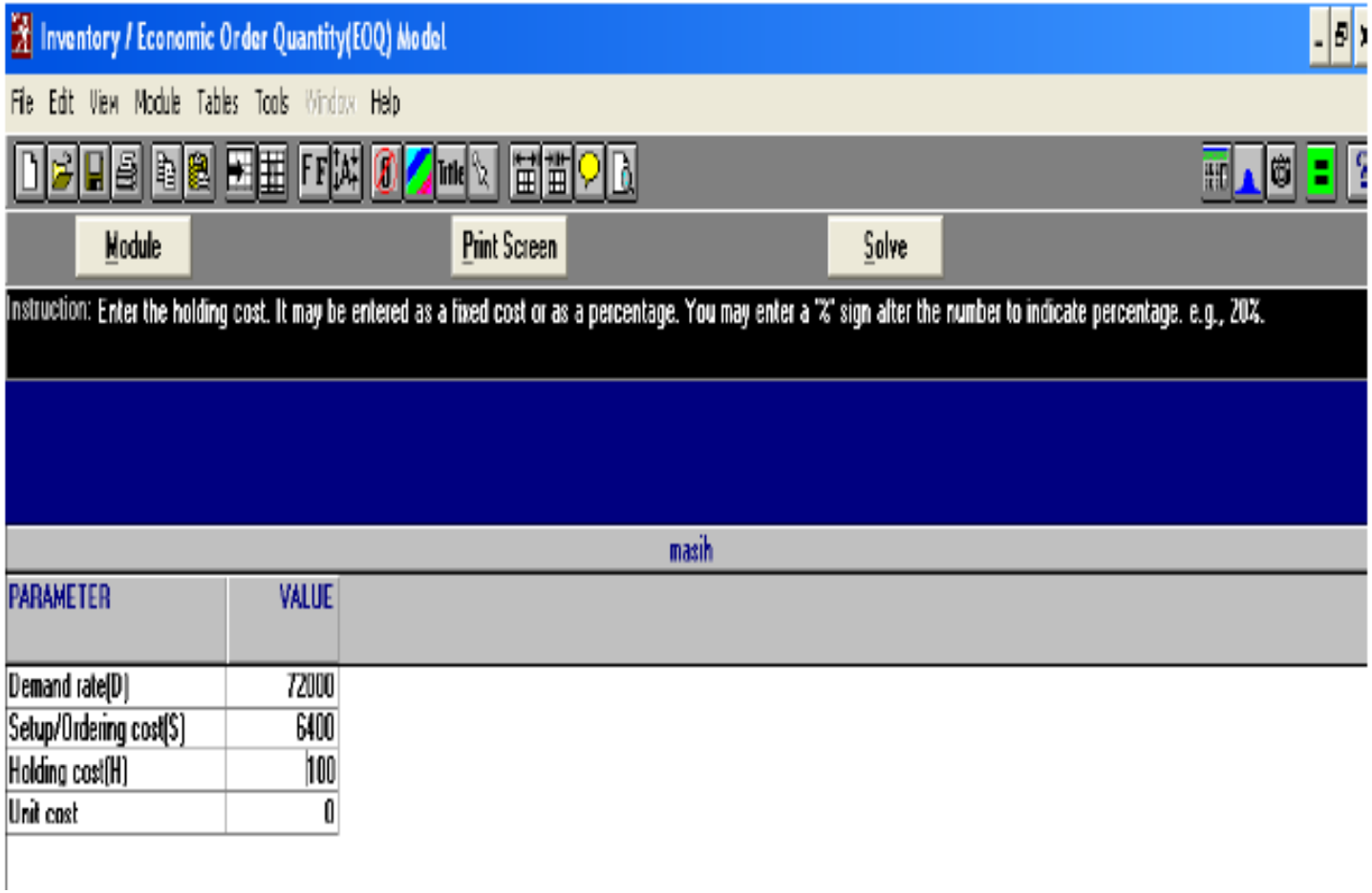
back order inventory

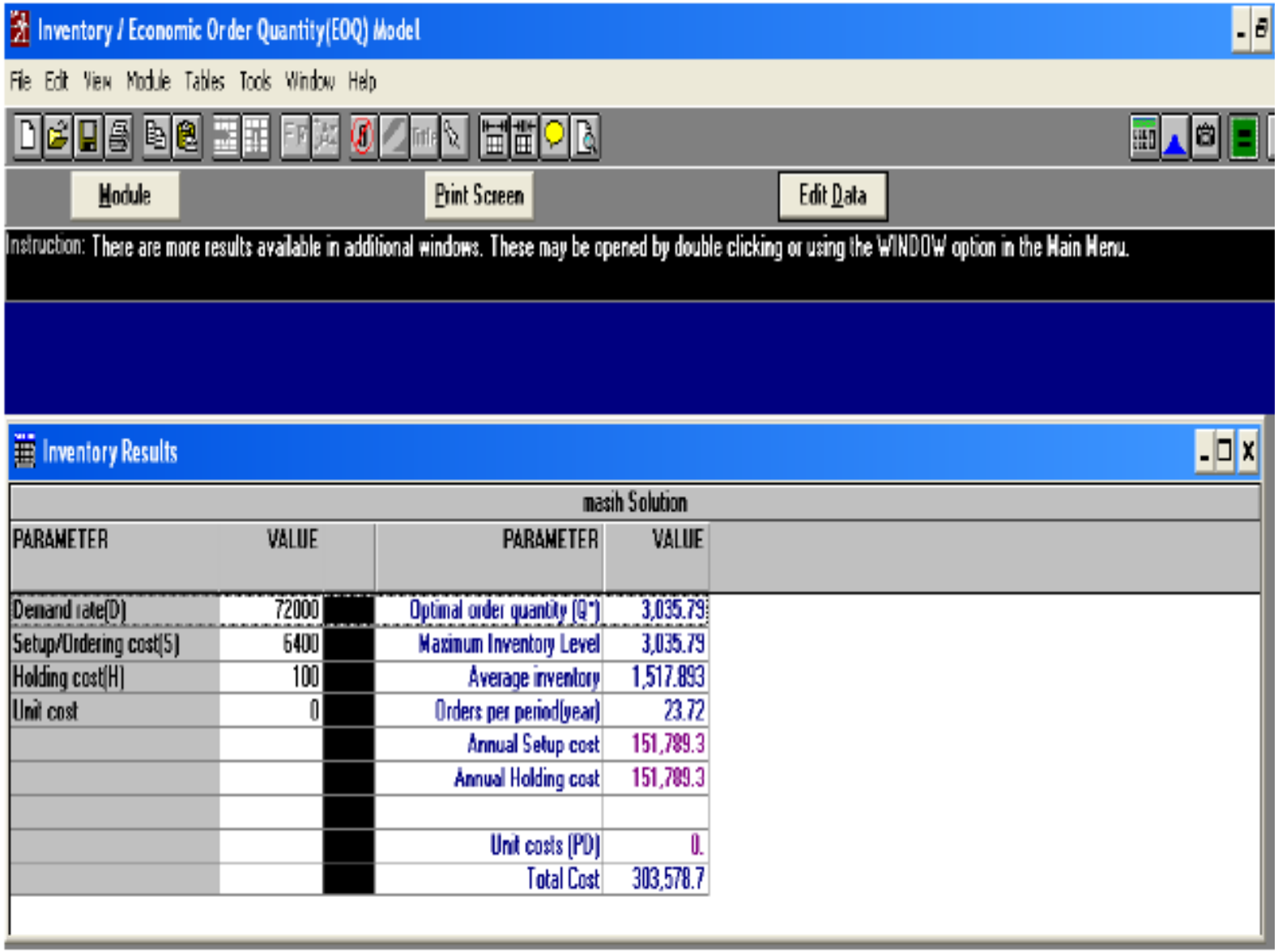
production with backorders

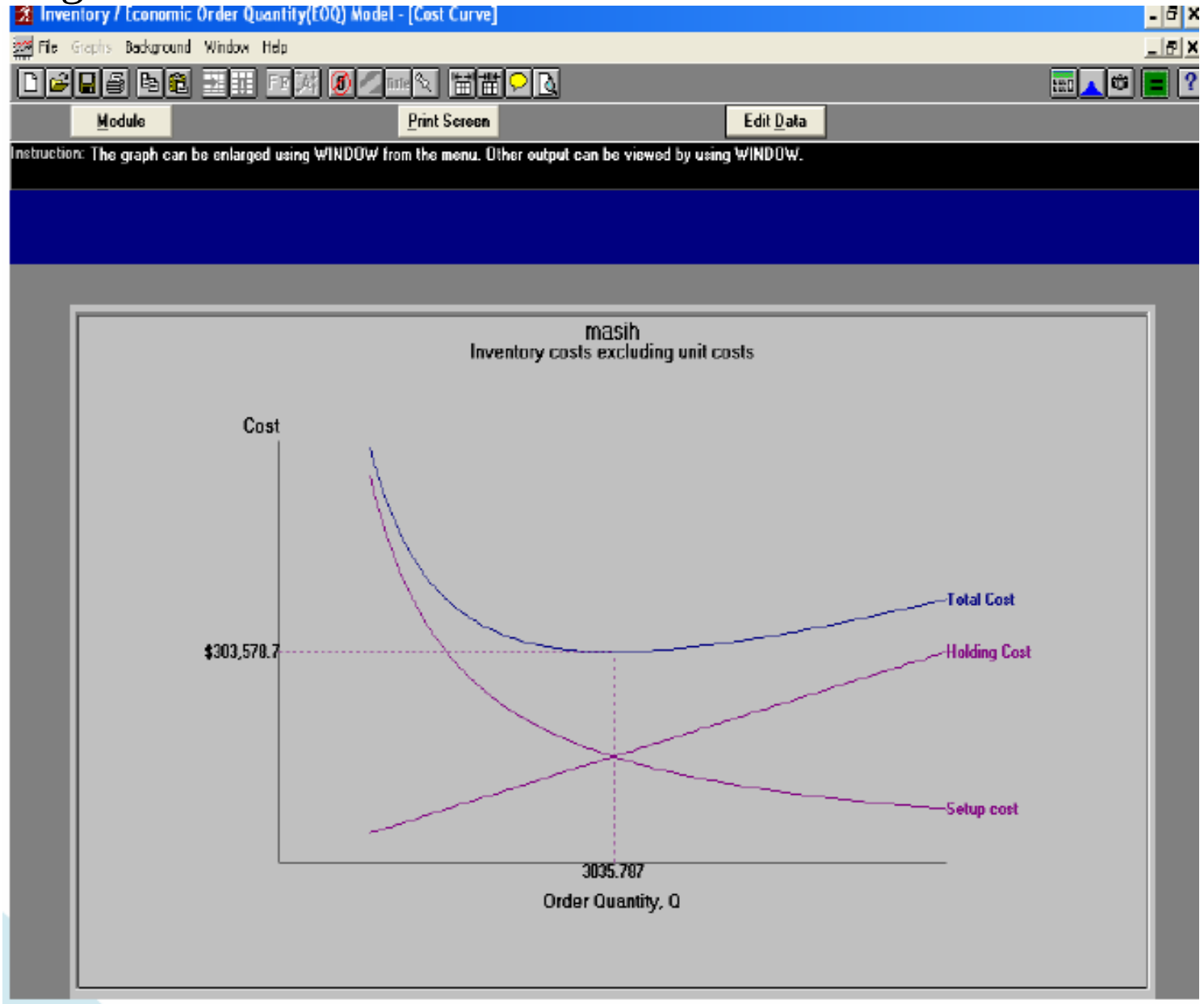
Quantity discount

ABC analysis

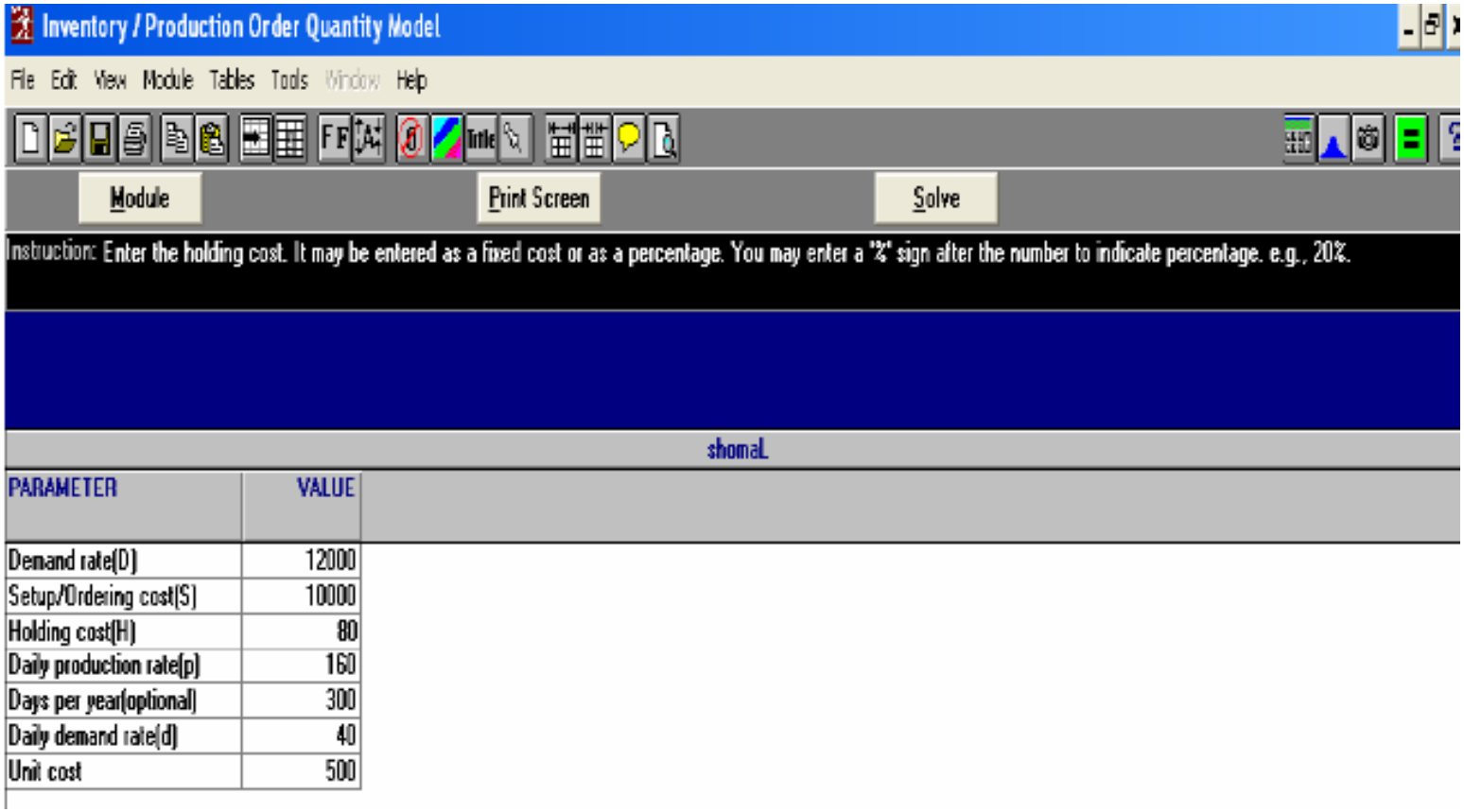
Economic order quantity:

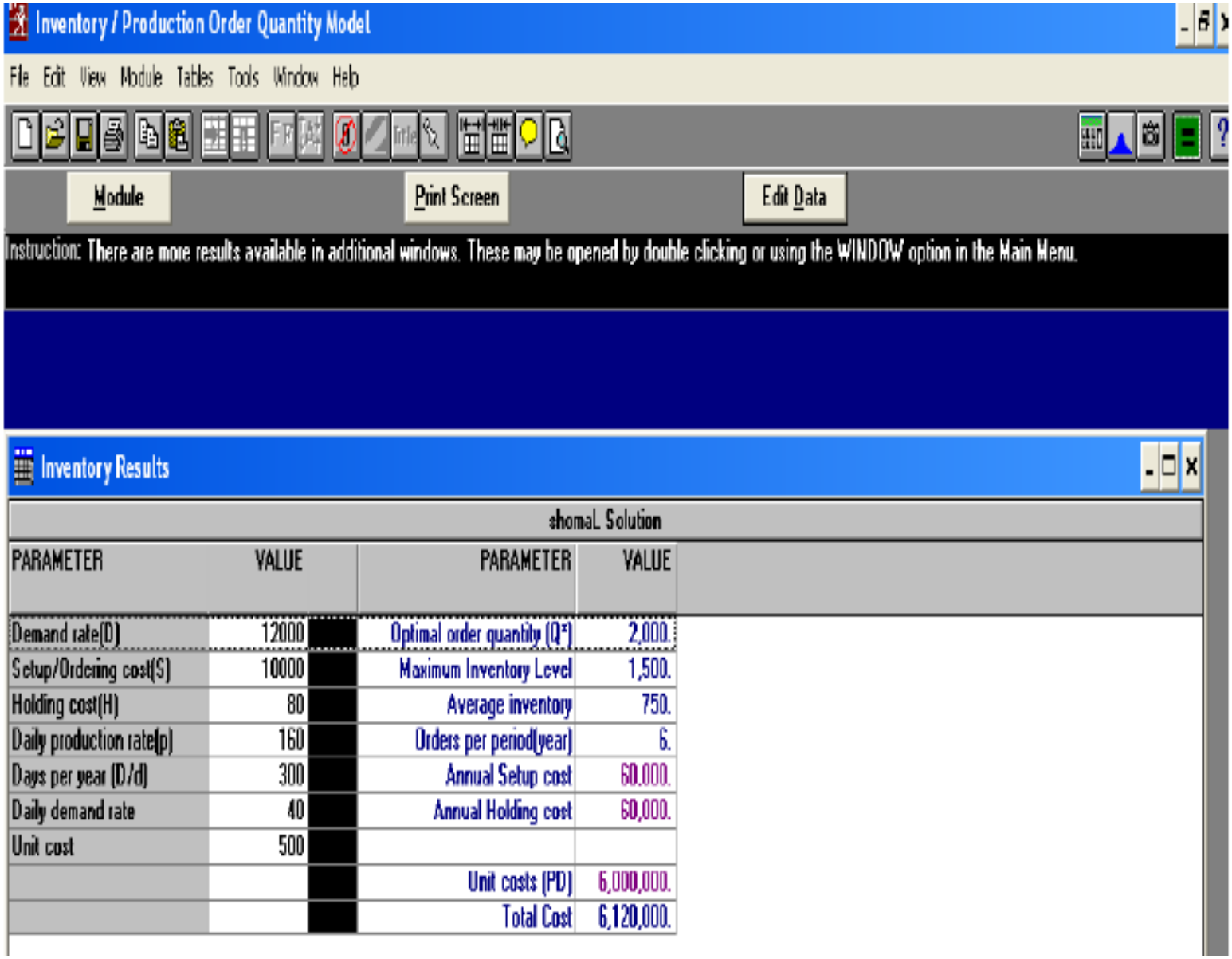



Inventory / Economic Order Quantity(EOQ) Model
File Edit View Module Tables Tools Window Help
Module
Print Screen
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Inventory Results
masih Solution
PARAMETER VALUE PARAMETER VALUE
Demand rate(D) 72000 Optimal order quantity (Q*) 3,035.79
Setup/Ordering cost(S) 6400 Maximum Inventory Level 3,035.79
Holding cost(H) 100 Average inventory 1,517.893
Unit cost 0 Orders per period(year) 23.72
Annual Setup cost 151,789.3
Annual Holding cost 151,789.3
Unit costs (PD) 0.
Total Cost 303,578.7

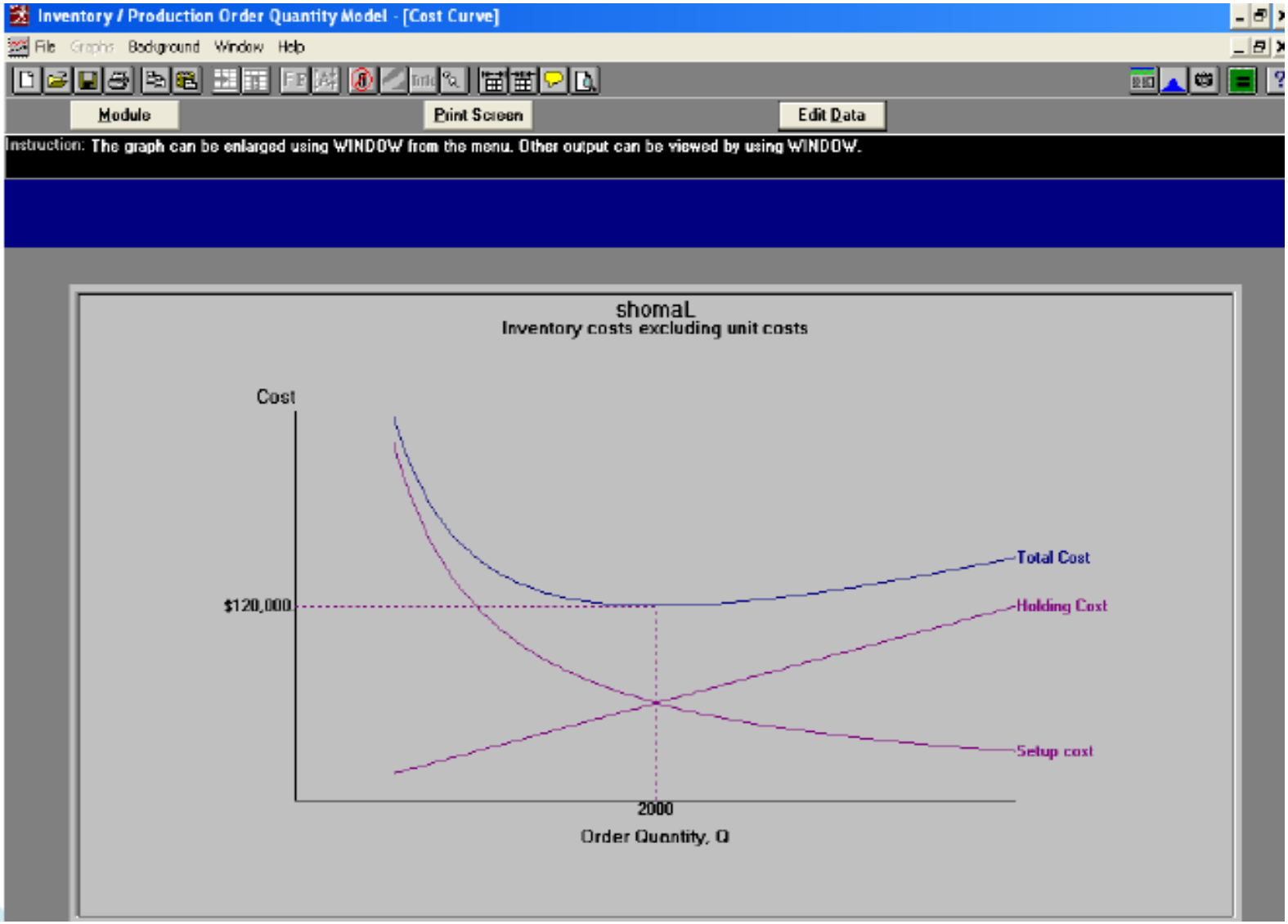

Inventory / Economic Order Quantity(EOQ) Model - [Cost Curve]
File Graphs Background Window Help
Module
Print Screen
Edit Data
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.
masih
Inventory costs excluding unit costs
Cost
$303,570.7
Total Cost
Holding Cost
Setup cost
3035.787
Order Quantity, Q

production order quantity

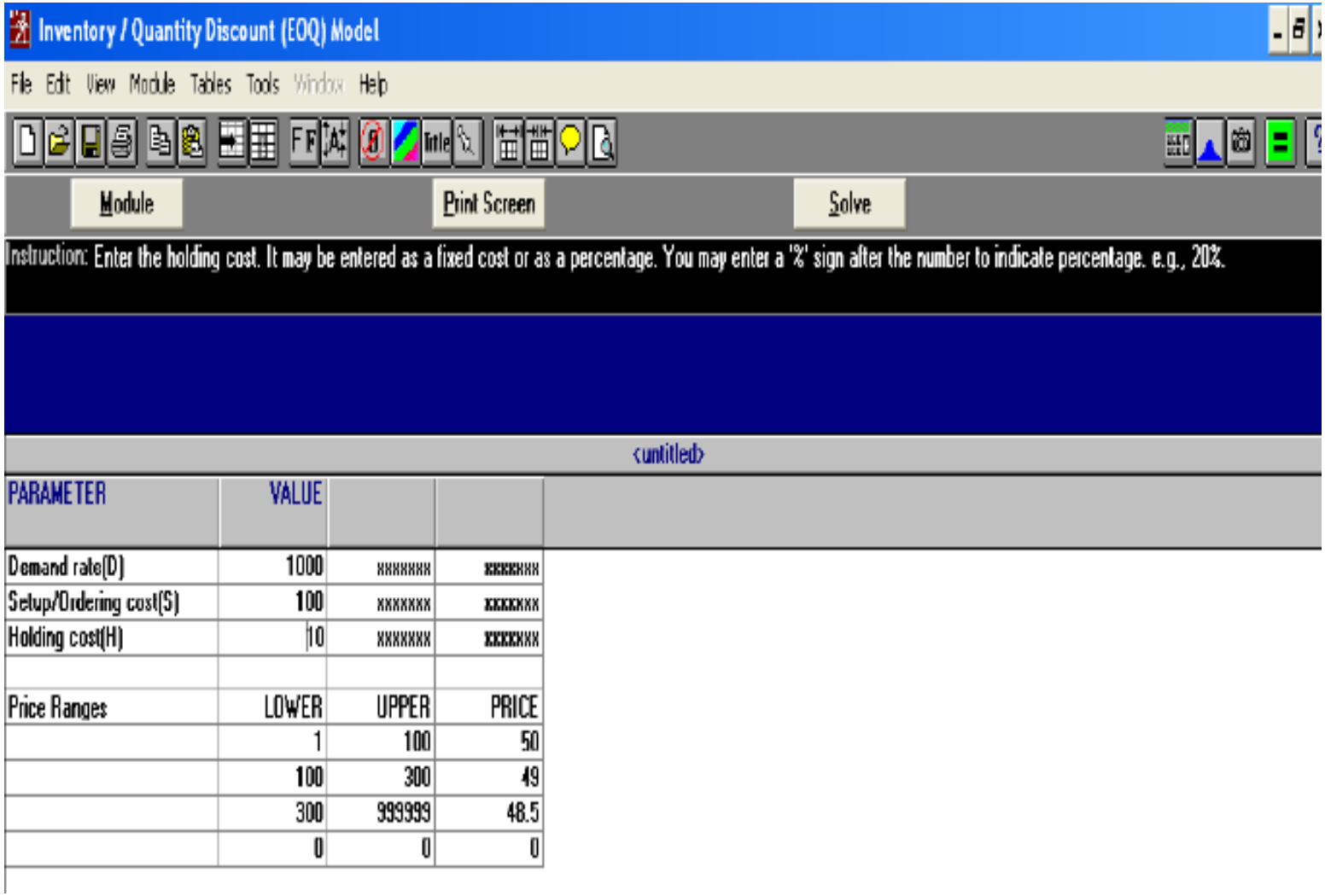


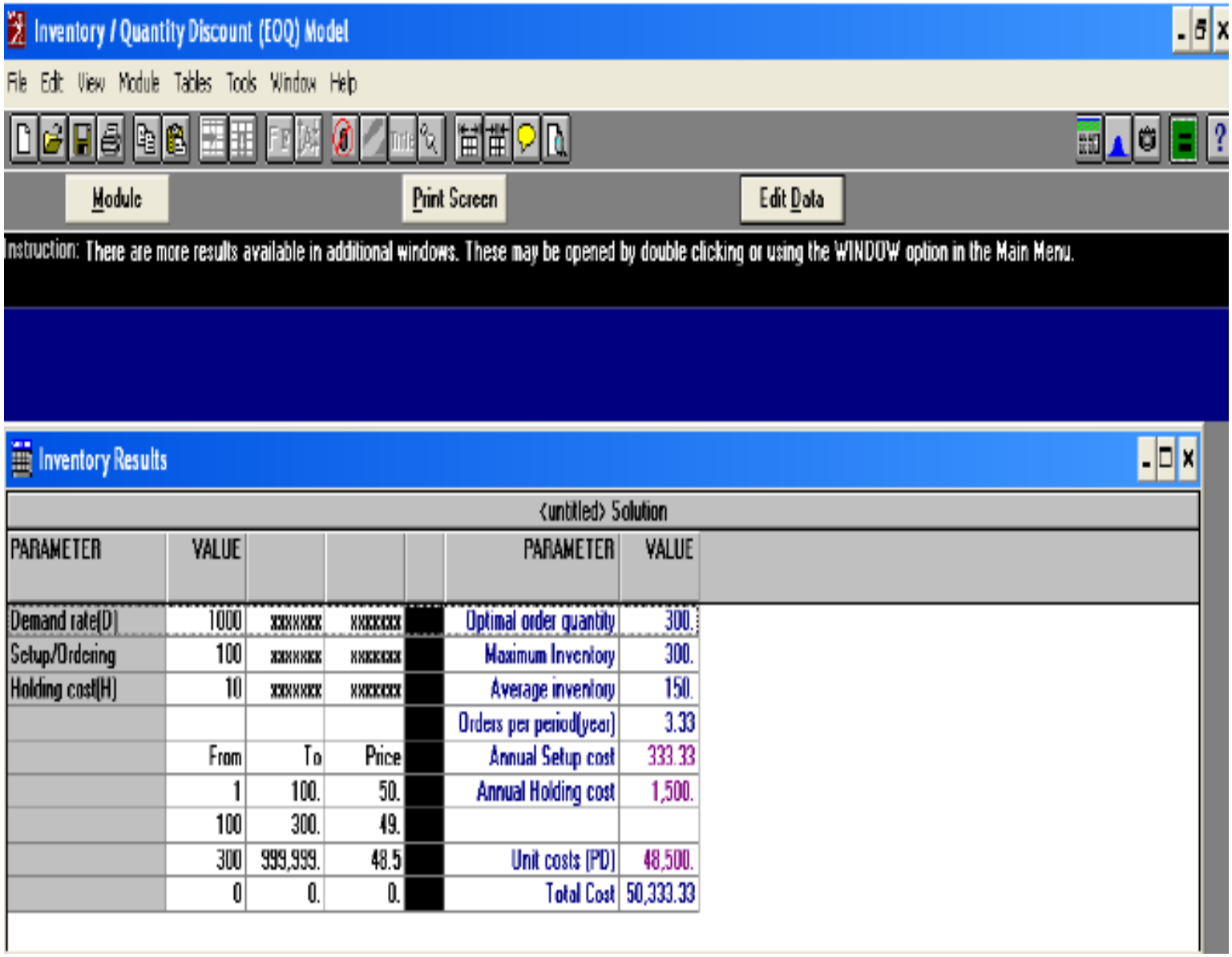

Inventory / Production Order Quantity Model
File Edit View Module Tables Tools Window Help
Module
Print Screen
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Inventory Results
shomaL Solution
PARAMETER VALUE PARAMETER VALUE
Demand rate(D) 12000 Optimal order quantity (Q*) 2,000.
Setup/Ordering cost(S) 10000 Maximum Inventory Level 1,500.
Holding cost(H) 80 Average inventory 750.
Daily production rate(p) 160 Orders per period(year) 6.
Days per year (D/d) 300 Annual Setup cost 60,000.
Daily demand rate 40 Annual Holding cost 60,000.
Unit cost 500
Unit costs (PD) 6,000,000.
Total Cost 6,120,000.

irmgn.ir


Inventory / Production Order Quantity Model - [Cost Curve]
File Graphs Background Window Help
Module
Print Screen
Edit Data
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.
shomaL
Inventory costs excluding unit costs
Cost
$120,000
Total Cost
Holding Cost
Setup cost
2000
Order Quantity, Q

Quantity discount




Inventory / Quantity Discount (EOQ) Model
File Edit View Module Tables Tools Window Help
Module
Print Screen
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Inventory Results
<untitled> Solution
PARAMETER VALUE PARAMETER VALUE
Demand rate(D) 1000 xxxxxx xxxxxx Optimal order quantity 300.
Setup/Ordering 100 xxxxxx xxxxxx Maximum Inventory 300.
Holding cost(H) 10 xxxxxx xxxxxx Average inventory 150.
Orders per period(year) 3.33
From To Price Annual Setup cost 333.33
1 100. 50. Annual Holding cost 1,500.
100 300. 49.
300 999,999. 48.5 Unit costs (PD) 48,500.
0 0. 0. Total Cost 50,333.33

Inventory / Quantity Discount (EOQ) Model - [Details]

File Edit View Module Tables Tools Window Help

Module | Print Screen | Edit Data

Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.

<untitled> Solution

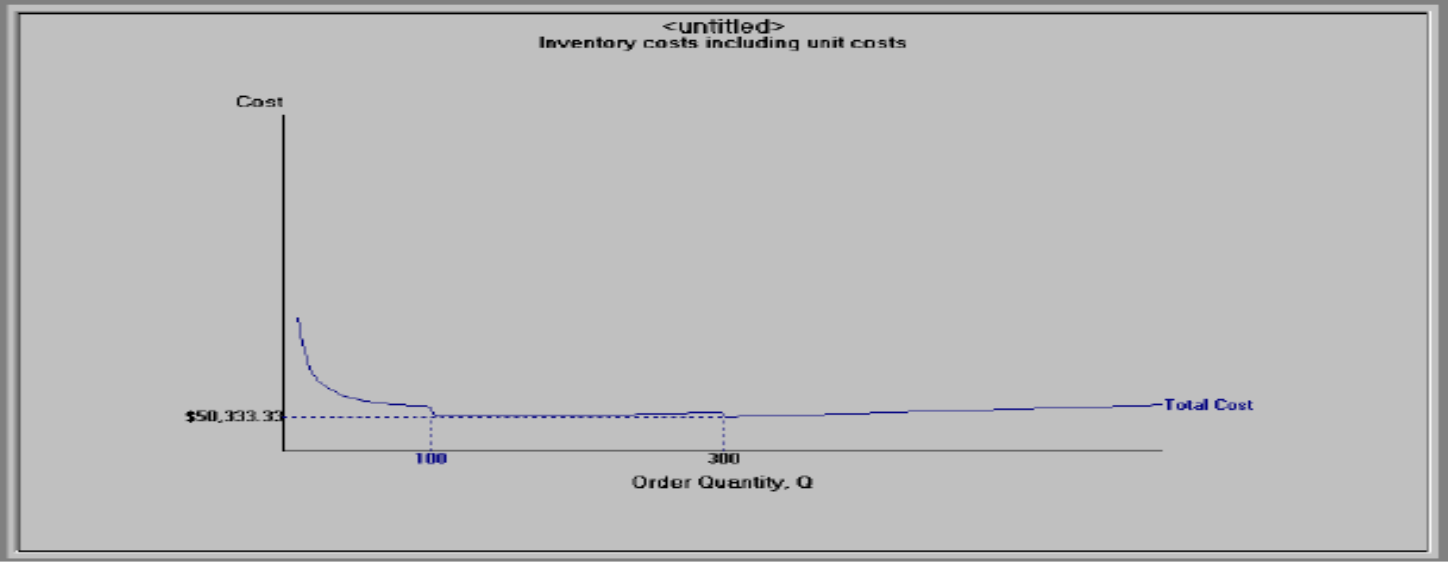
Range	Quantity	Total Setup Cost	Total Holding Cost	Total Unit Cost	Total Cost
1 to 100					
100 to 300	141.4214	707.1068	707.1068	49,000.	50,414.21
300 to 999999	300.	333.3333	1,500.	48,500.	50,333.33
0 to 0					

Inventory / Quantity Discount (EOQ) Model - [Cost Curve]

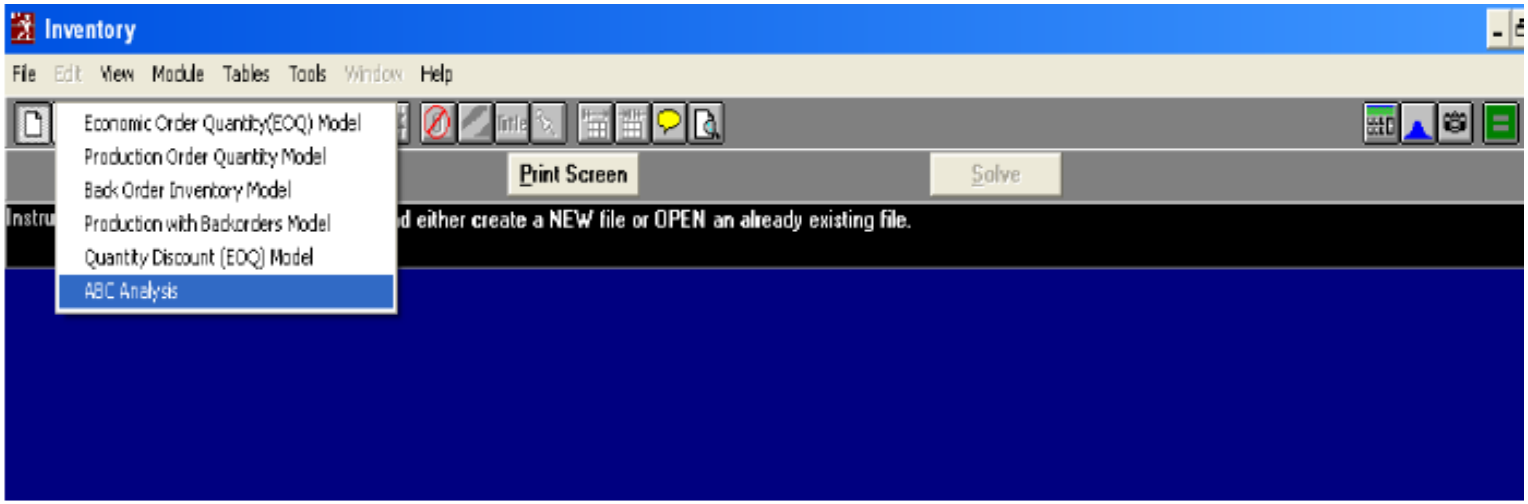
File Graphs Background Window Help

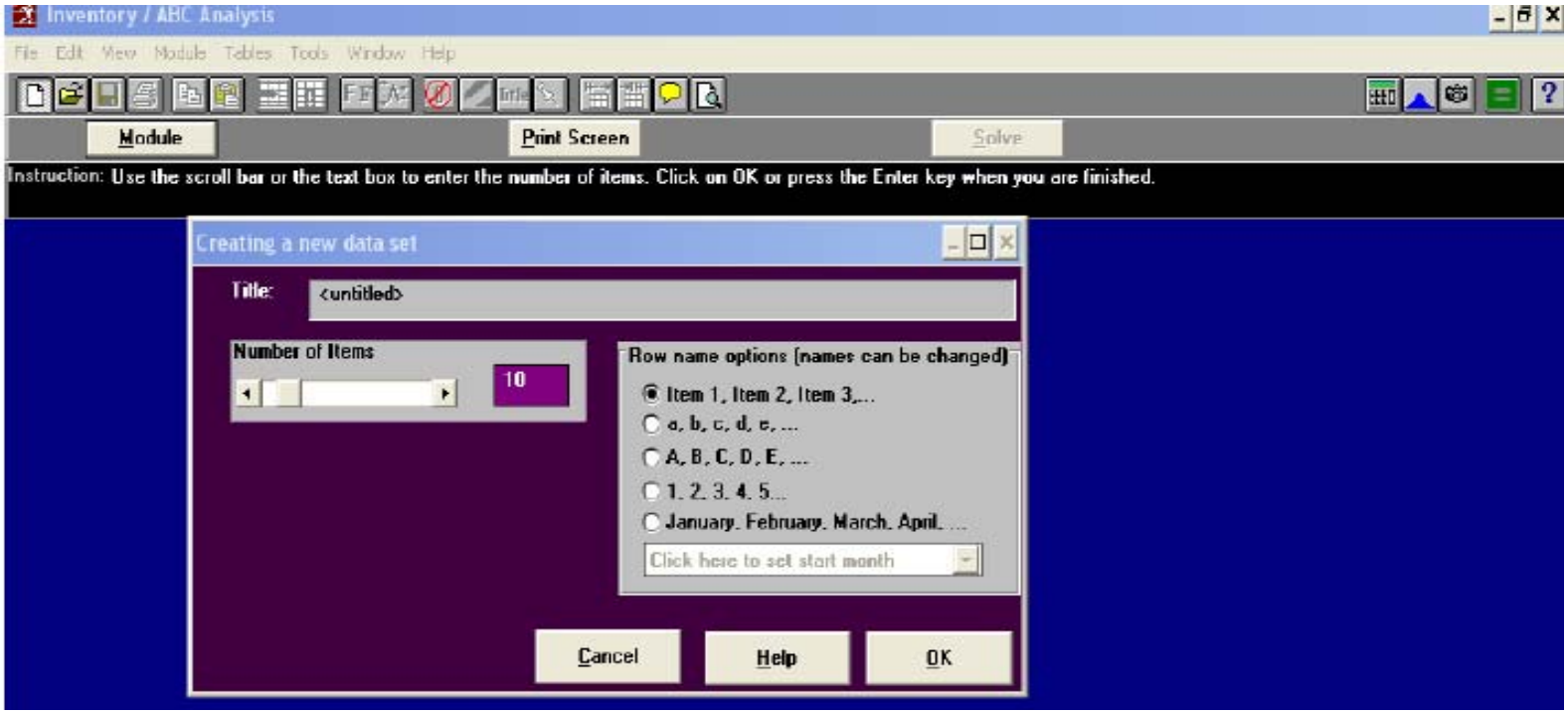
Module | Print Screen | Edit Data

Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW.



ABC analysis





Inventory / ABC Analysis

File Edit View Modules Tools Window Help

Module | Print Screen | Solve

Instruction: Enter the unit price for item 10. Any non-negative value is permissable.

Percent of items that are A items: 20 | Percent of items that are B items: 30

<untitled>

ITEM NAME	DEMAND	UNIT PRICE
Item 1	100	2
Item 2	200	25
Item 3	400	3
Item 4	500	4
Item 5	700	26
Item 6	100	15
Item 7	600	13
Item 8	400	12
Item 9	300	7
Item 10	200	8

Inventory / ABC Analysis

File Edit View Module Tables Tools Window Help

Module | Print Screen | Edit Data

Instruction:

Percent of items that are A items: 20 | Percent of items that are B items: 30

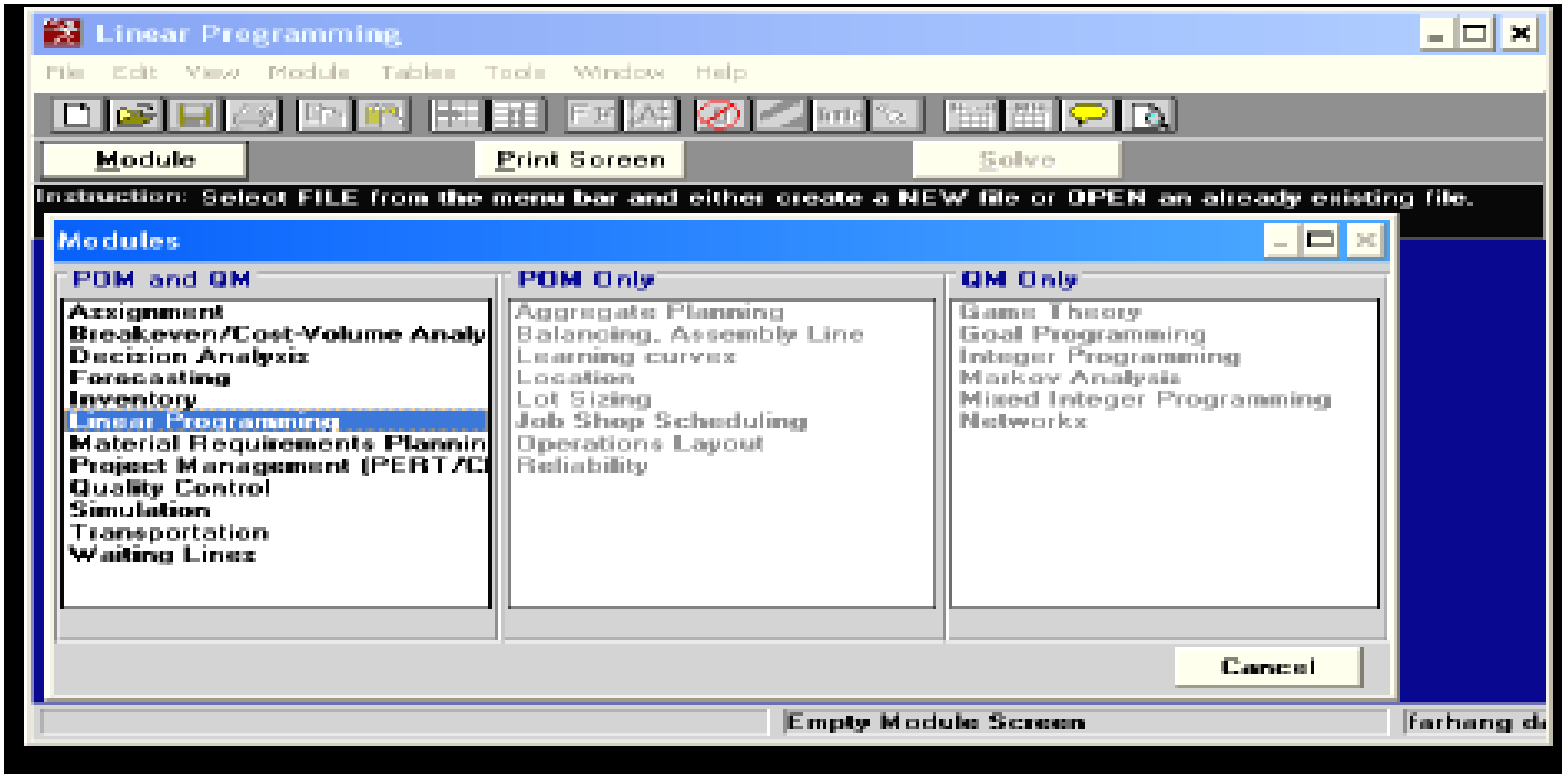
Inventory Results

<untitled> Solution

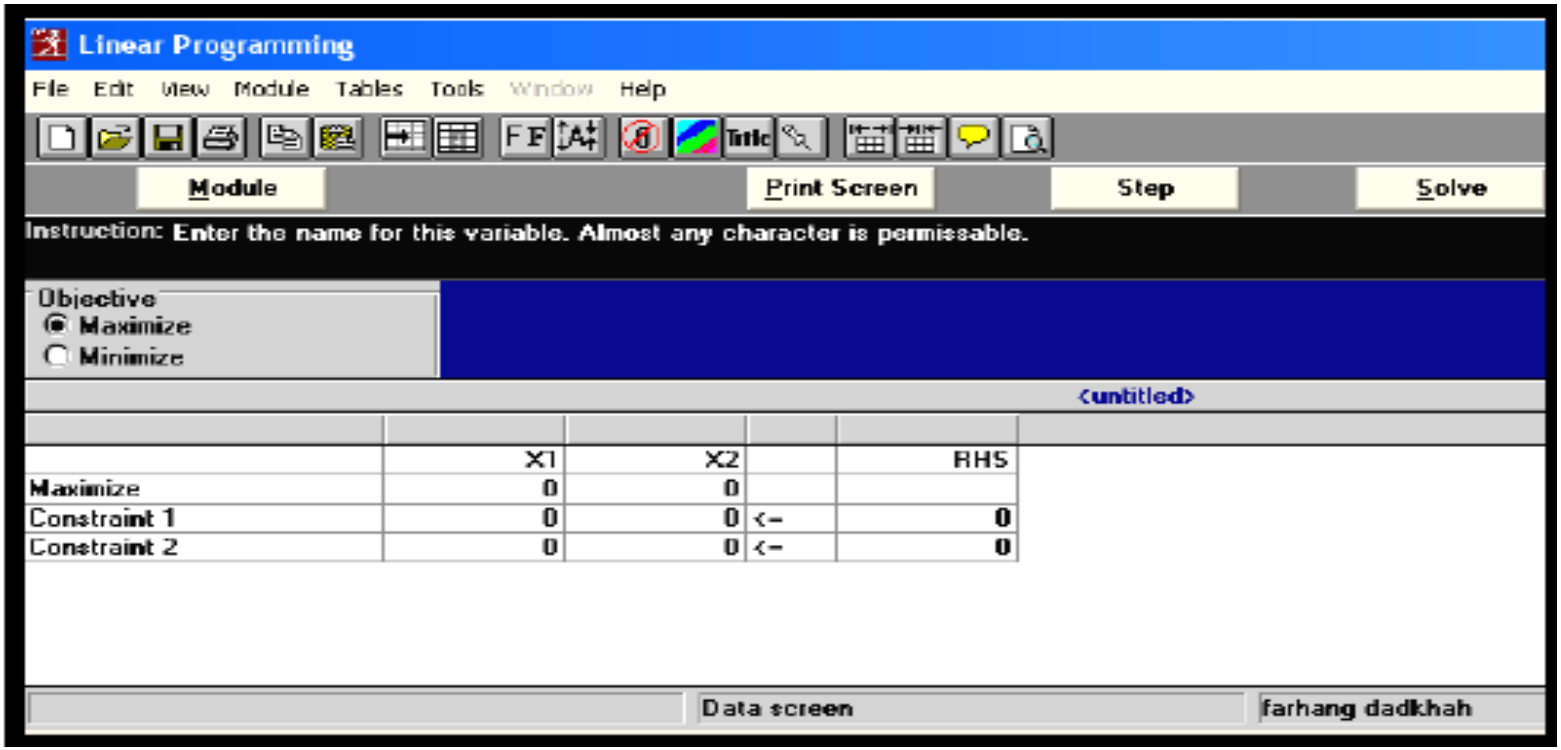
Item name	Demand	Price	Dollar Volume	Percent of Units	Percent of $-Vol	Cumulty $-vol %	Category
Item 5	700.	26.	18,200.	20.	40.99	40.99	A
Item 7	600.	13.	7,800.	17.14	17.57	58.56	A
Item 2	200.	25.	5,000.	5.71	11.26	69.82	B
Item 8	400.	12.	4,800.	11.43	10.81	80.63	B
Item 9	300.	7.	2,100.	8.57	4.73	85.36	B
Item 4	500.	4.	2,000.	14.29	4.5	89.86	C
Item 10	200.	8.	1,600.	5.71	3.6	93.47	C
Item 6	100.	15.	1,500.	2.86	3.38	96.85	C
Item 3	400.	3.	1,200.	11.43	2.7	99.55	C
Item 1	100.	2.	200.	2.86	0.45	100.	C
TOTAL	3,500.		44,400.				

6-1 مدلهای برنامه ریزی خطی (*Linear programming*)

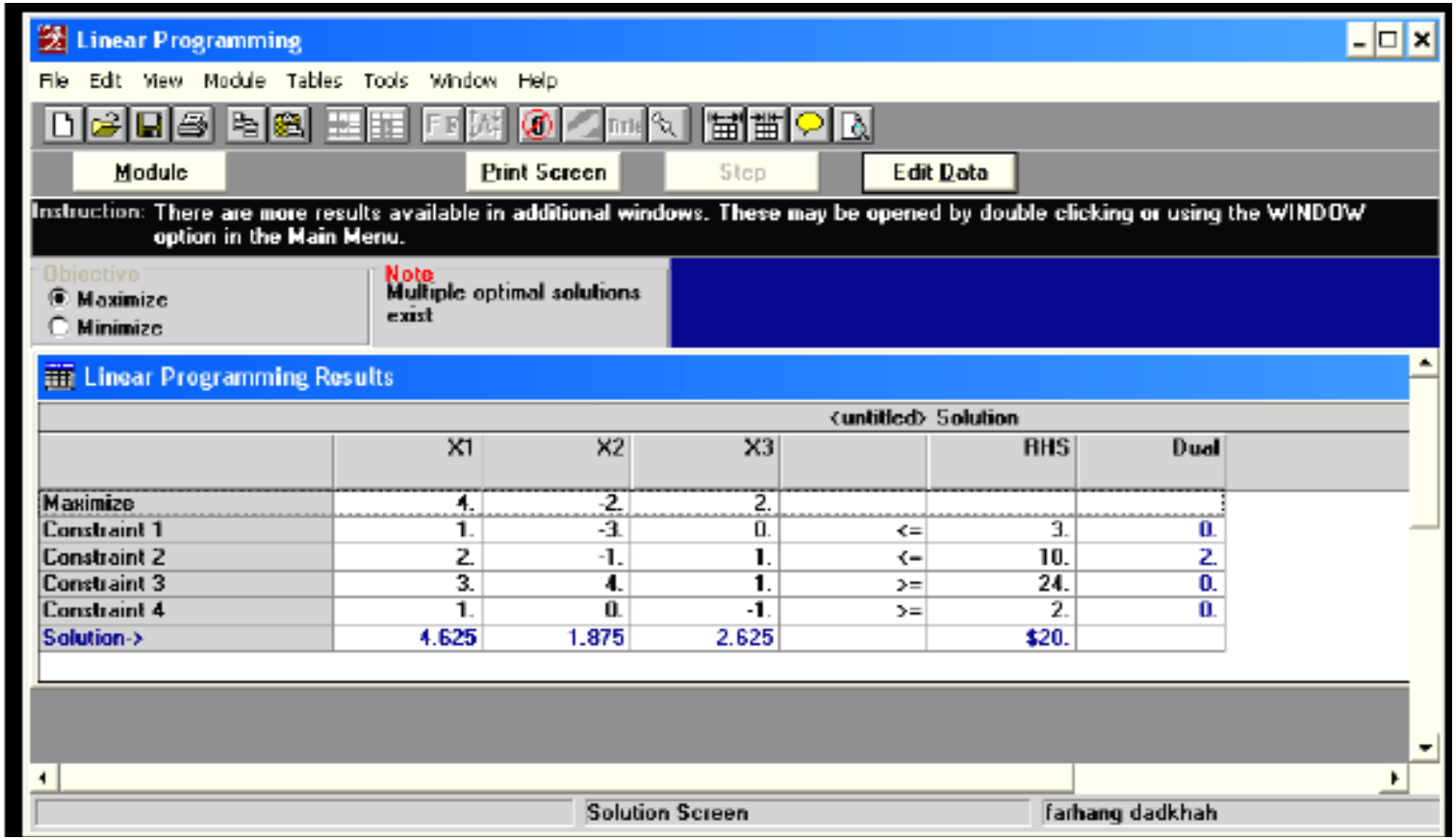
نکته: عناصر تابع هدف به سمت چپ منتقل نمی شوند به همین دلیل عناصر تابع هدف در تابلوی بهینه منفی می باشند



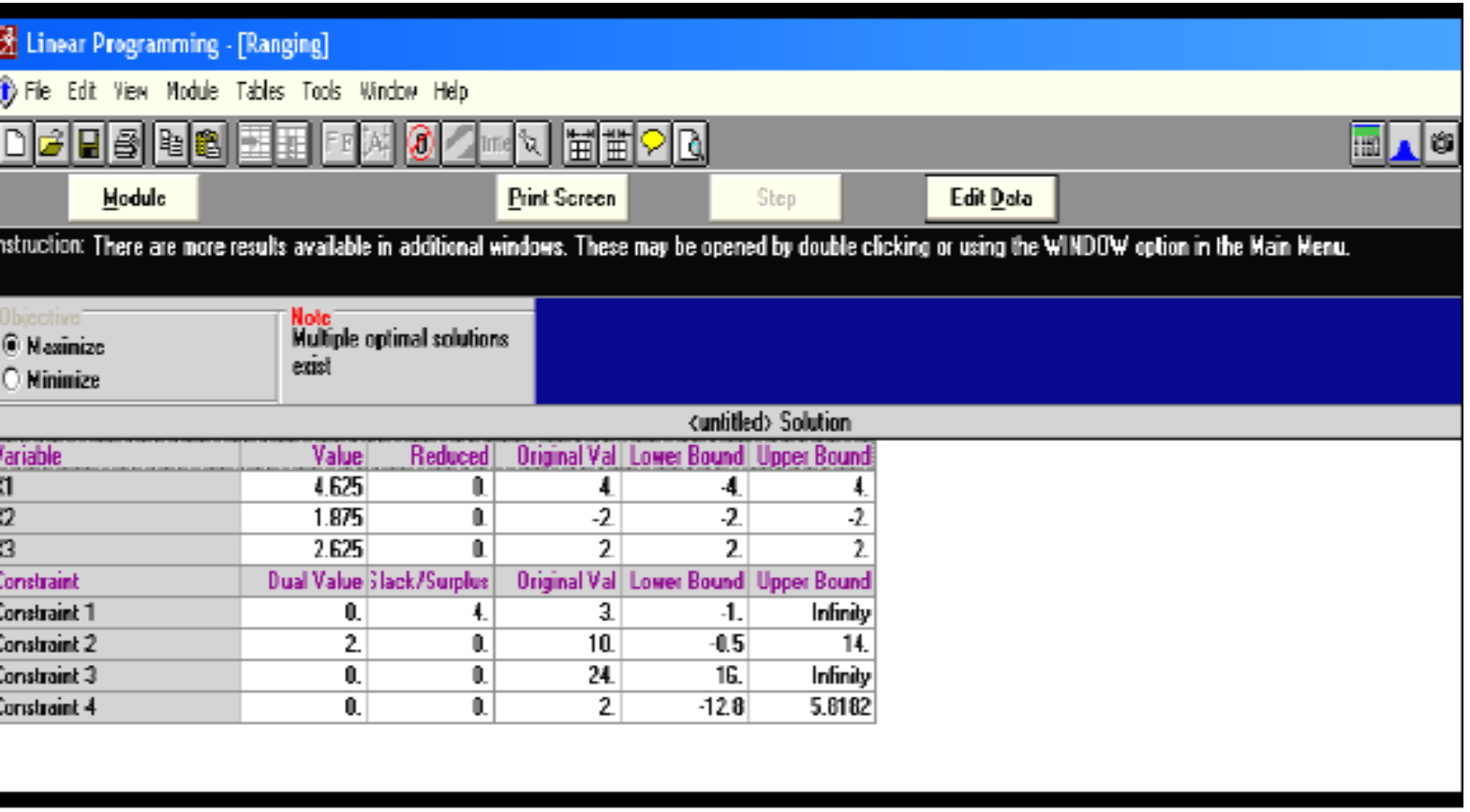

Creating a new data set
Title:
<untitled>
Number of Constraints
2
Number of Variables
2
Objective
Maximize
Minimize
Row name options (names can be changed)
Constraint 1, Constraint 2, Constr
a, b, c, d, e, ...
A, B, C, D, E, ...
1, 2, 3, 4, 5...
January, February, March, April, ...
Click here to set start month
Cancel
Help
OK


Linear Programming
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Solve
Instruction: Enter the name for this variable. Almost any character is permissable.
Objective
Maximize
Minimize
<untitled>
X1 X2 RHS
Maximize 0 0
Constraint 1 0 0 <- 0
Constraint 2 0 0 <- 0
Data screen
farhang dadkhah

:inear programming results

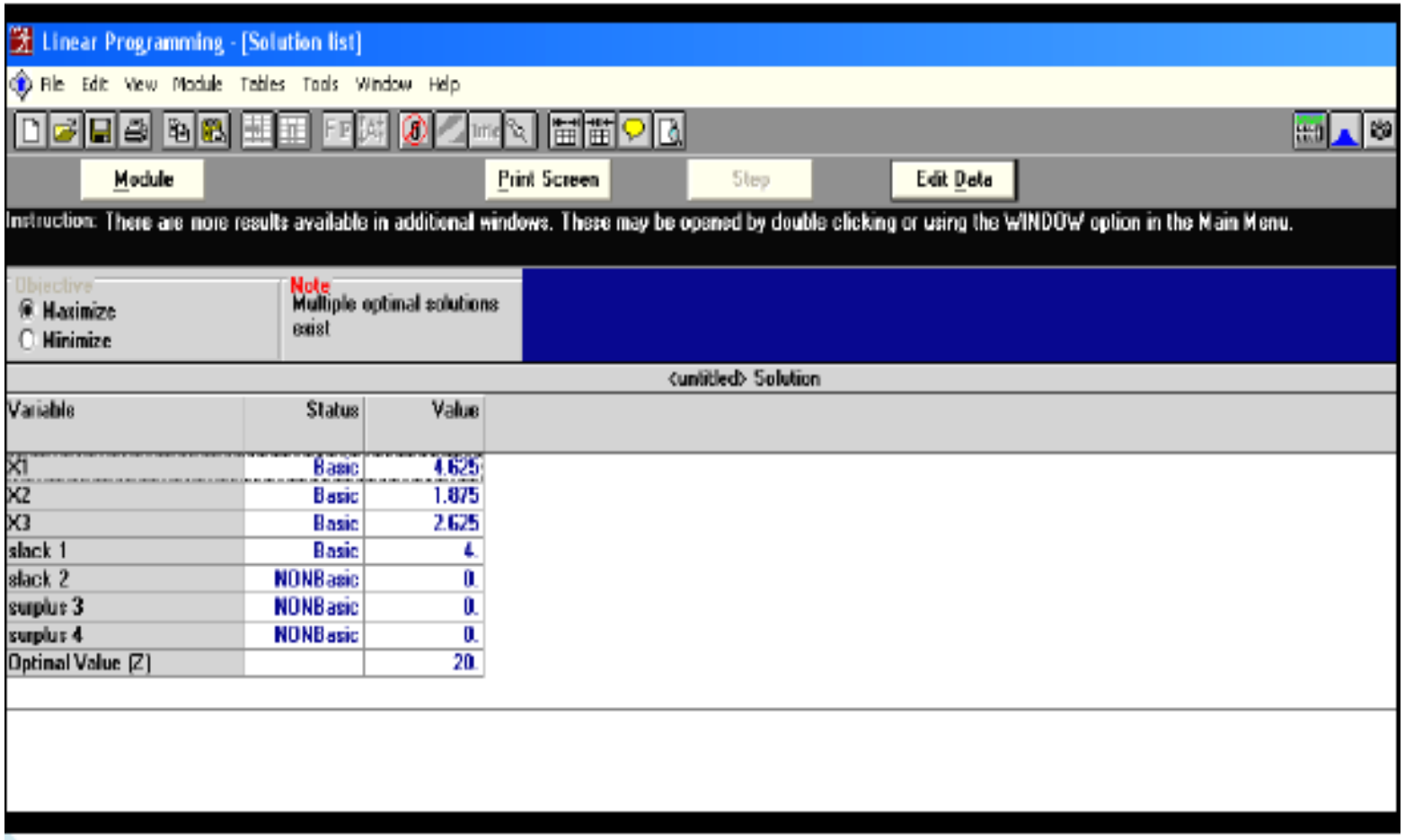


Ranging



Variable	Value	Reduced	Original Val	Lower Bound	Upper Bound
X1	4.625	0.	4.	-4.	4.
X2	1.875	0.	-2.	-2.	-2.
X3	2.625	0.	2.	2.	2.
Constraint	Dual Value	Slack/Surplus	Original Val	Lower Bound	Upper Bound
Constraint 1	0.	4.	3.	-1.	Infinity
Constraint 2	2.	0.	10.	-0.5	14.
Constraint 3	0.	0.	24.	16.	Infinity
Constraint 4	0.	0.	2.	-12.8	5.8182

solution list



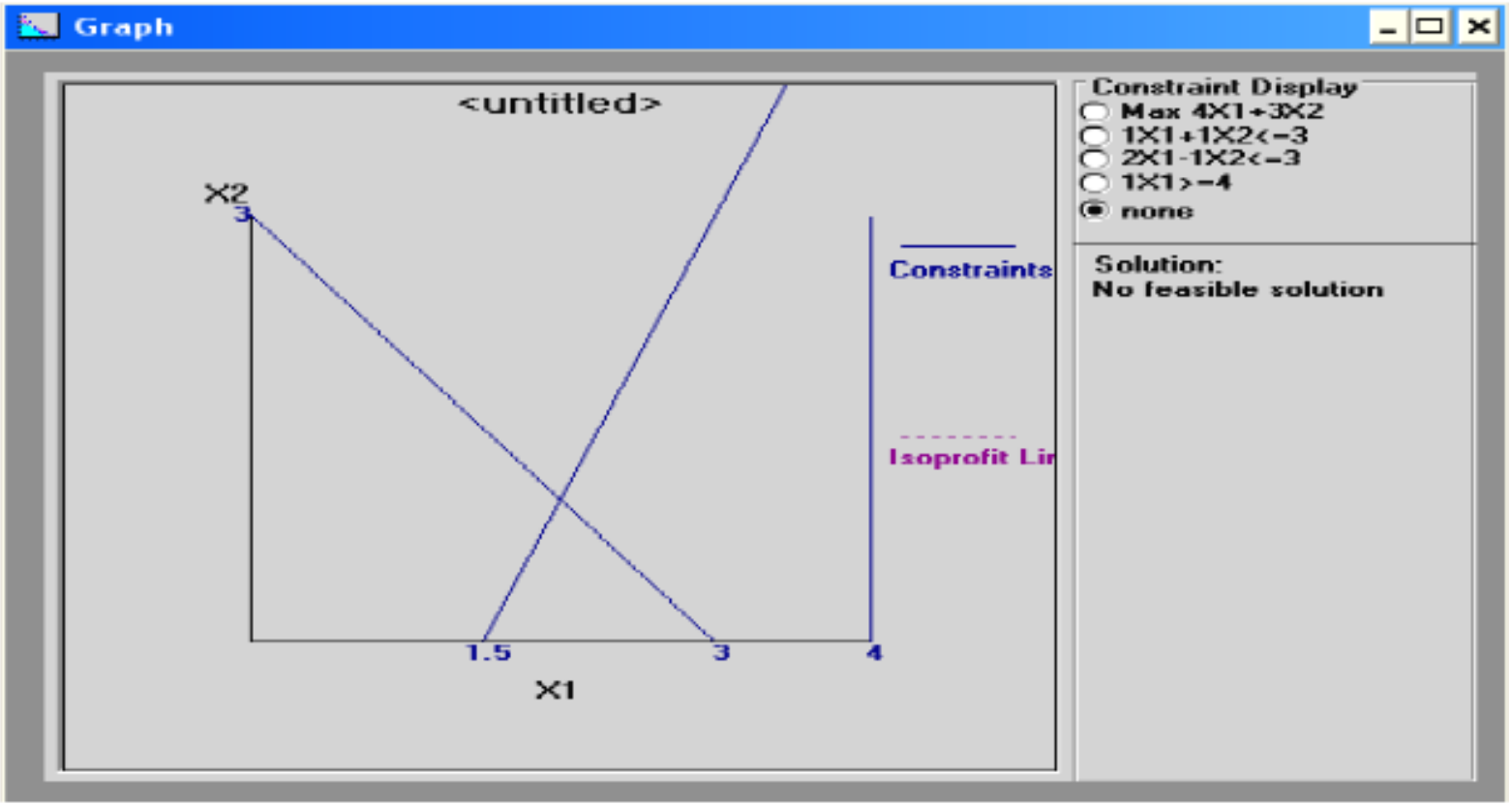
Iterations

Iterations

<untitled> Solution

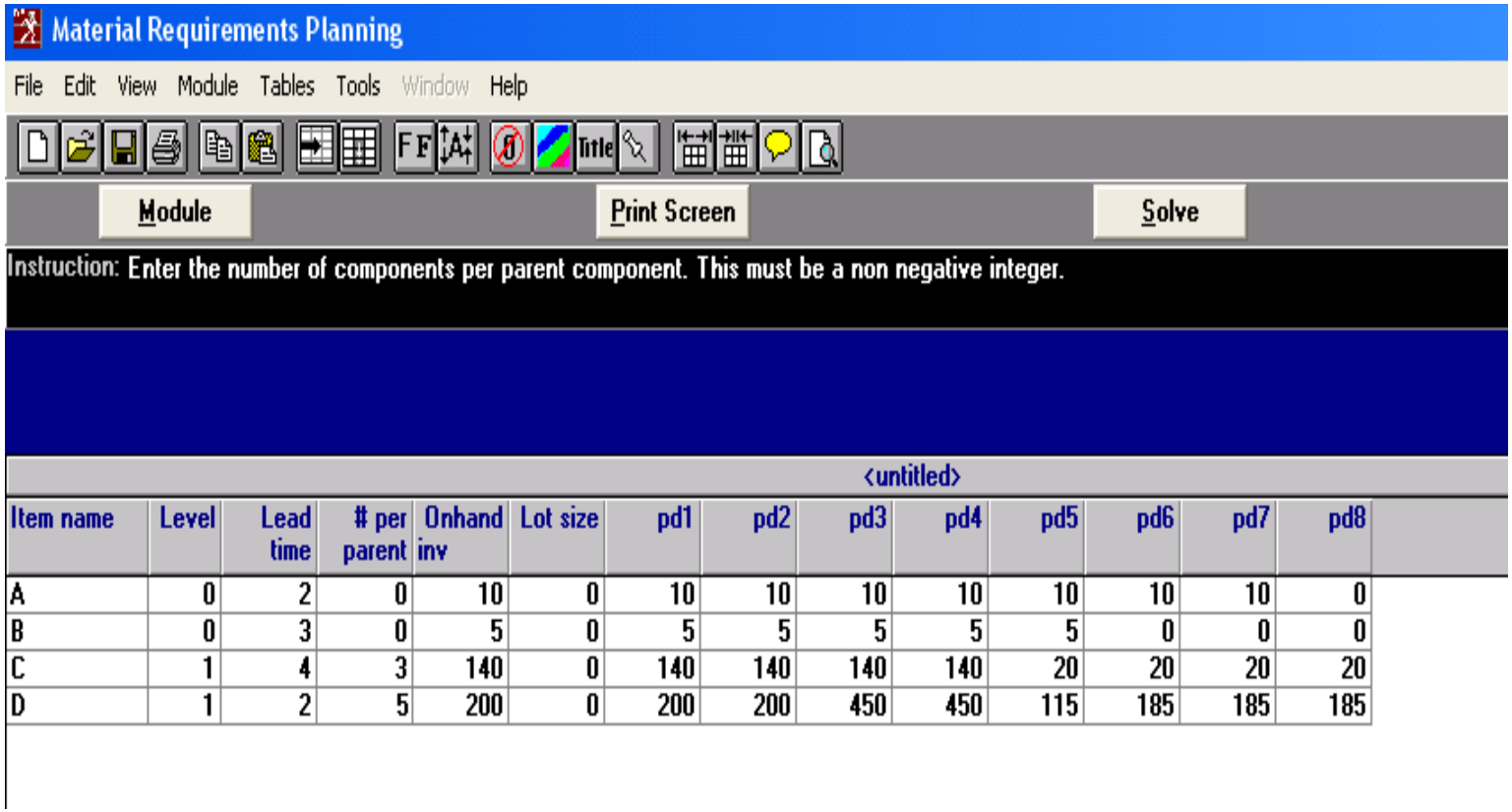
Cj	Basic Variables	5 X1	-1 X2	0 artfcl 1	0 surplus 1	0 slack 2	0 slack 3	Quantity
Iteration 1								
	cj-zj	2.	1.	0.	-1.	0.	0.	
0	artfcl 1	2.	1.	1.	-1.	0.	0.	1.
0	slack 2	5.	53.	0.	0.	1.	0.	14.
0	slack 3	2.	54.	0.	0.	0.	1.	53.
Iteration 2								
	cj-zj	0.	0.	-1.	0.	0.	0.	
5	X1	1.	0.5	0.5	-0.5	0.	0.	0.5
0	slack 2	0.	50.5	-2.5	2.5	1.	0.	11.5
0	slack 3	0.	53.	-1.	1.	0.	1.	52.
Iteration 3								
	cj-zj	0.	-3.5	-2.5	2.5	0.	0.	
5	X1	1.	0.5	0.5	-0.5	0.	0.	0.5
0	slack 2	0.	50.5	-2.5	2.5	1.	0.	11.5
0	slack 3	0.	53.	-1.	1.	0.	1.	52.
Iteration 4								
	cj-zj	0.	-54.	0.	0.	-1.	0.	
5	X1	1.	10.6	0.	0.	0.2	0.	2.8
0	surplus 1	0.	20.2	-1.	1.	0.4	0.	4.6
0	slack 3	0.	32.8	0.	0.	-0.4	1.	47.4

Graph



7-1: (*Material Requirements Planning*)

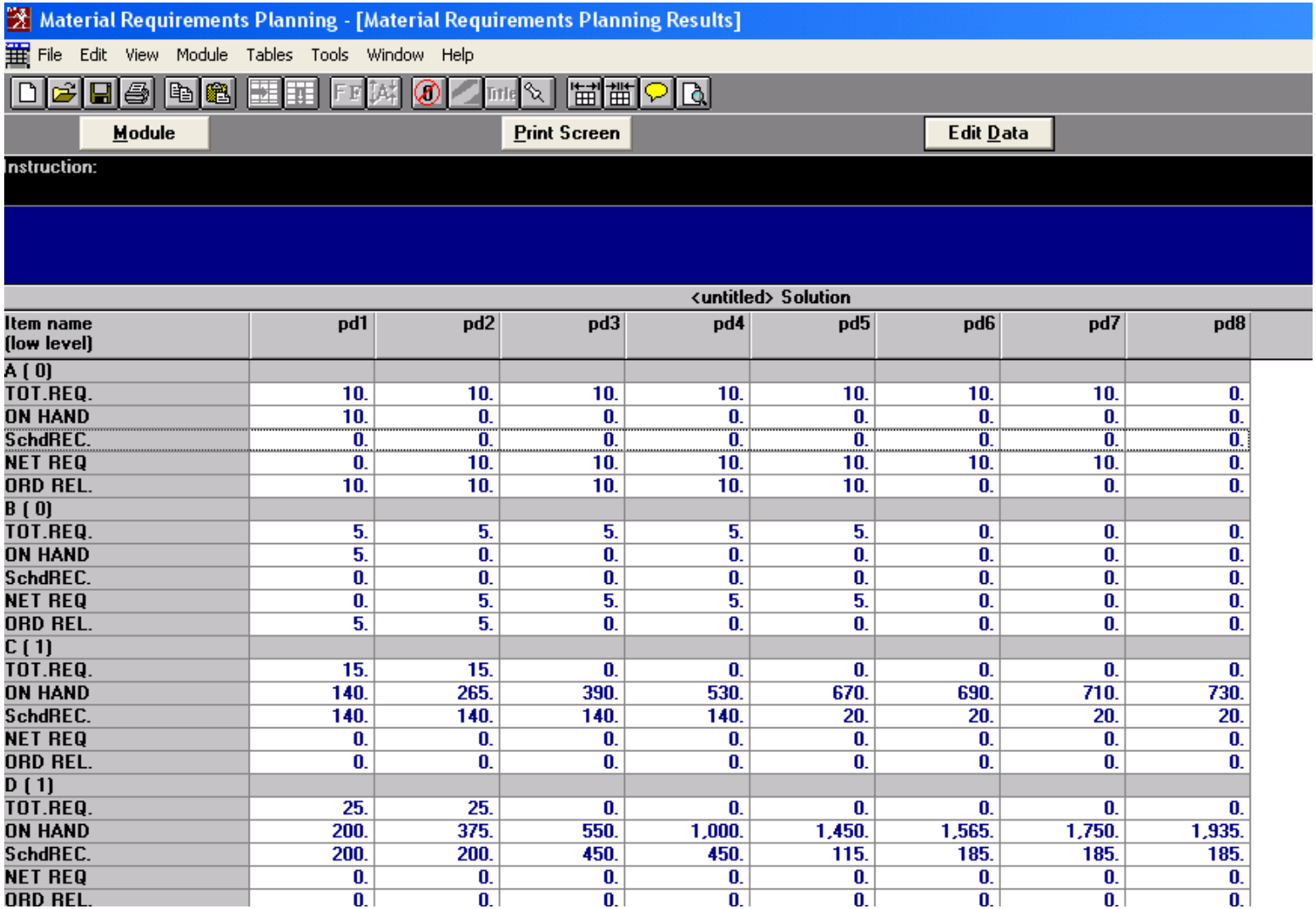
برنامه ریزی مواد مورد نیاز MRP



<untitled>

Item name	Level	Lead time	# per parent	Onhand inv	Lot size	pd1	pd2	pd3	pd4	pd5	pd6	pd7	pd8
A	0	2	0	10	0	10	10	10	10	10	10	10	0
B	0	3	0	5	0	5	5	5	5	5	0	0	0
C	1	4	3	140	0	140	140	140	140	20	20	20	20
D	1	2	5	200	0	200	200	450	450	115	185	185	185

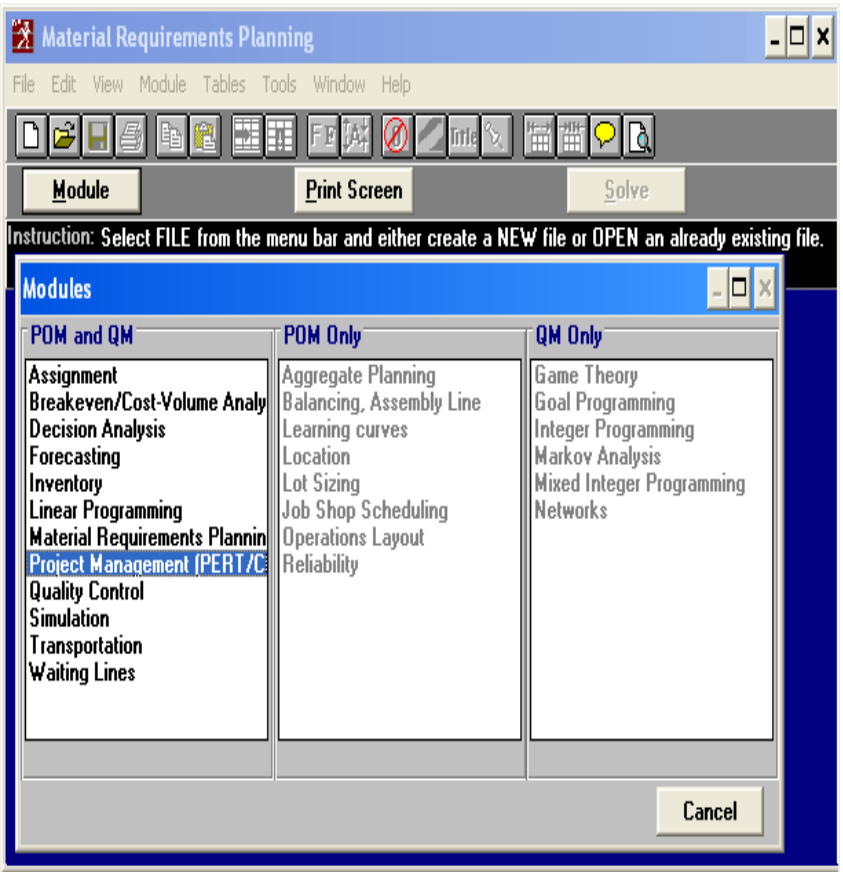
(*Material requirements planning*):



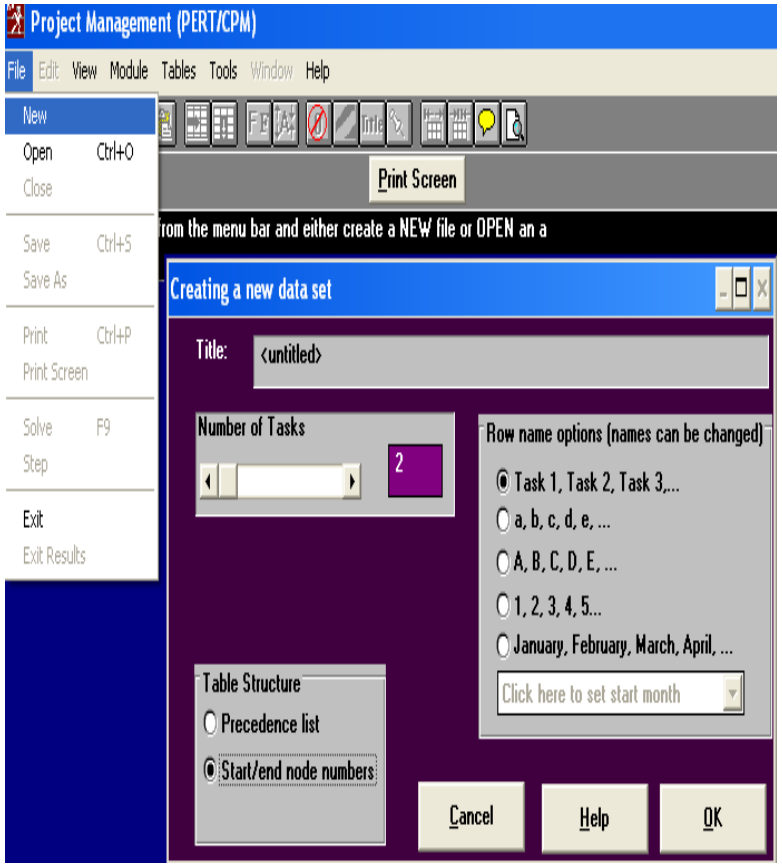
<untitled> Solution

Item name (low level)	pd1	pd2	pd3	pd4	pd5	pd6	pd7	pd8
A (0)								
TOT.REQ.	10.	10.	10.	10.	10.	10.	10.	0.
ON HAND	10.	0.	0.	0.	0.	0.	0.	0.
SchdREC.	0.	0.	0.	0.	0.	0.	0.	0.
NET REQ	0.	10.	10.	10.	10.	10.	10.	0.
ORD REL.	10.	10.	10.	10.	10.	0.	0.	0.
B (0)								
TOT.REQ.	5.	5.	5.	5.	5.	0.	0.	0.
ON HAND	5.	0.	0.	0.	0.	0.	0.	0.
SchdREC.	0.	0.	0.	0.	0.	0.	0.	0.
NET REQ	0.	5.	5.	5.	5.	0.	0.	0.
ORD REL.	5.	5.	0.	0.	0.	0.	0.	0.
C (1)								
TOT.REQ.	15.	15.	0.	0.	0.	0.	0.	0.
ON HAND	140.	265.	390.	530.	670.	690.	710.	730.
SchdREC.	140.	140.	140.	140.	20.	20.	20.	20.
NET REQ	0.	0.	0.	0.	0.	0.	0.	0.
ORD REL.	0.	0.	0.	0.	0.	0.	0.	0.
D (1)								
TOT.REQ.	25.	25.	0.	0.	0.	0.	0.	0.
ON HAND	200.	375.	550.	1,000.	1,450.	1,565.	1,750.	1,935.
SchdREC.	200.	200.	450.	450.	115.	185.	185.	185.
NET REQ	0.	0.	0.	0.	0.	0.	0.	0.
ORD REL.	0.	0.	0.	0.	0.	0.	0.	0.

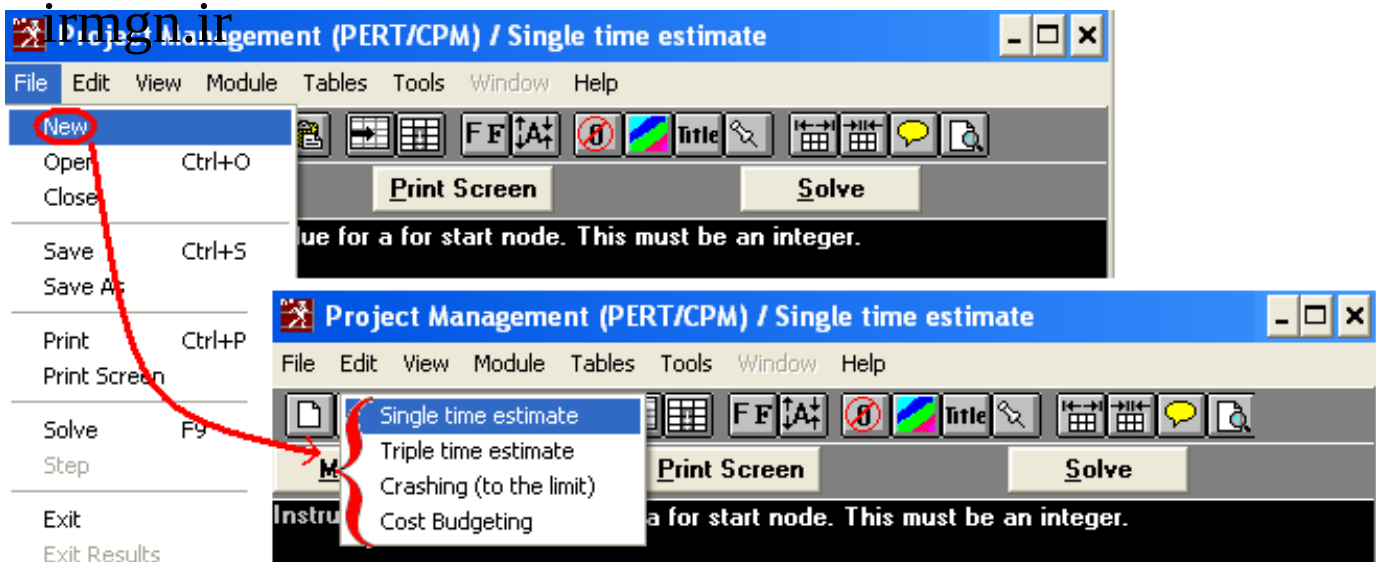
مدیریت پروژه:(*Project Management*)8-1



1

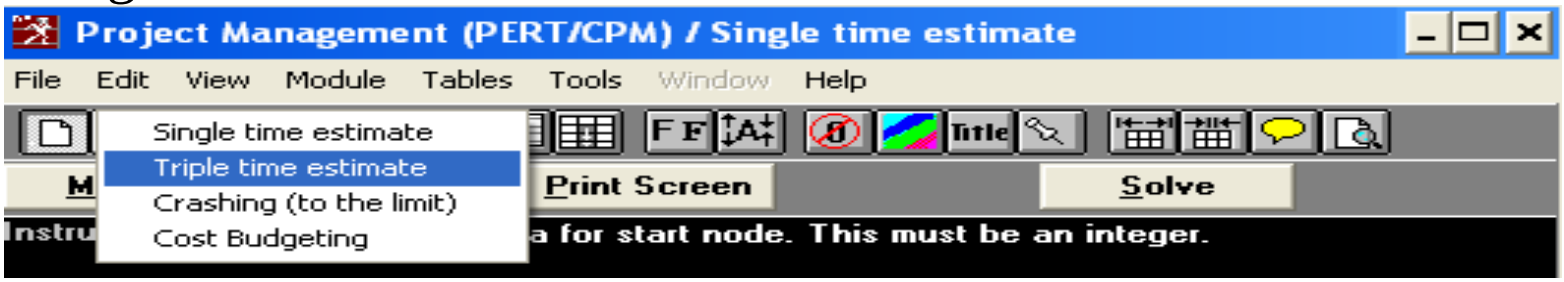


2



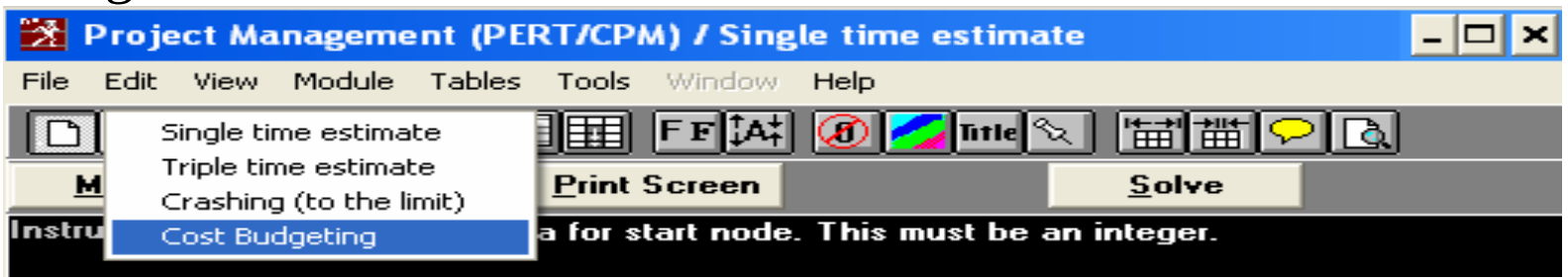
4 روش وجود دارد

1-single time estimateمی باشد که در آن نام گروه مبدا و مقصد هر فعالیت و زمان فعالیت را مشخص می کنیم و سپس گزینه Solve راانتخاب می کنیم

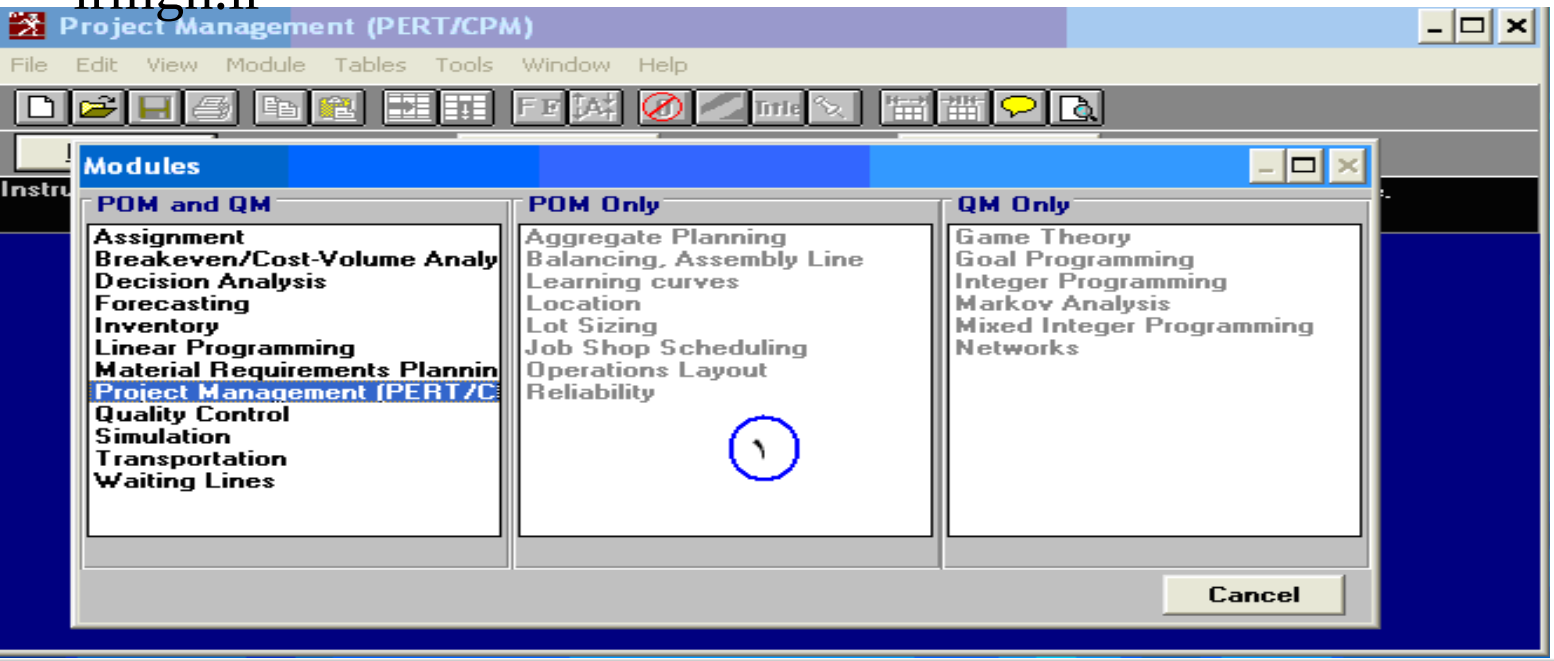


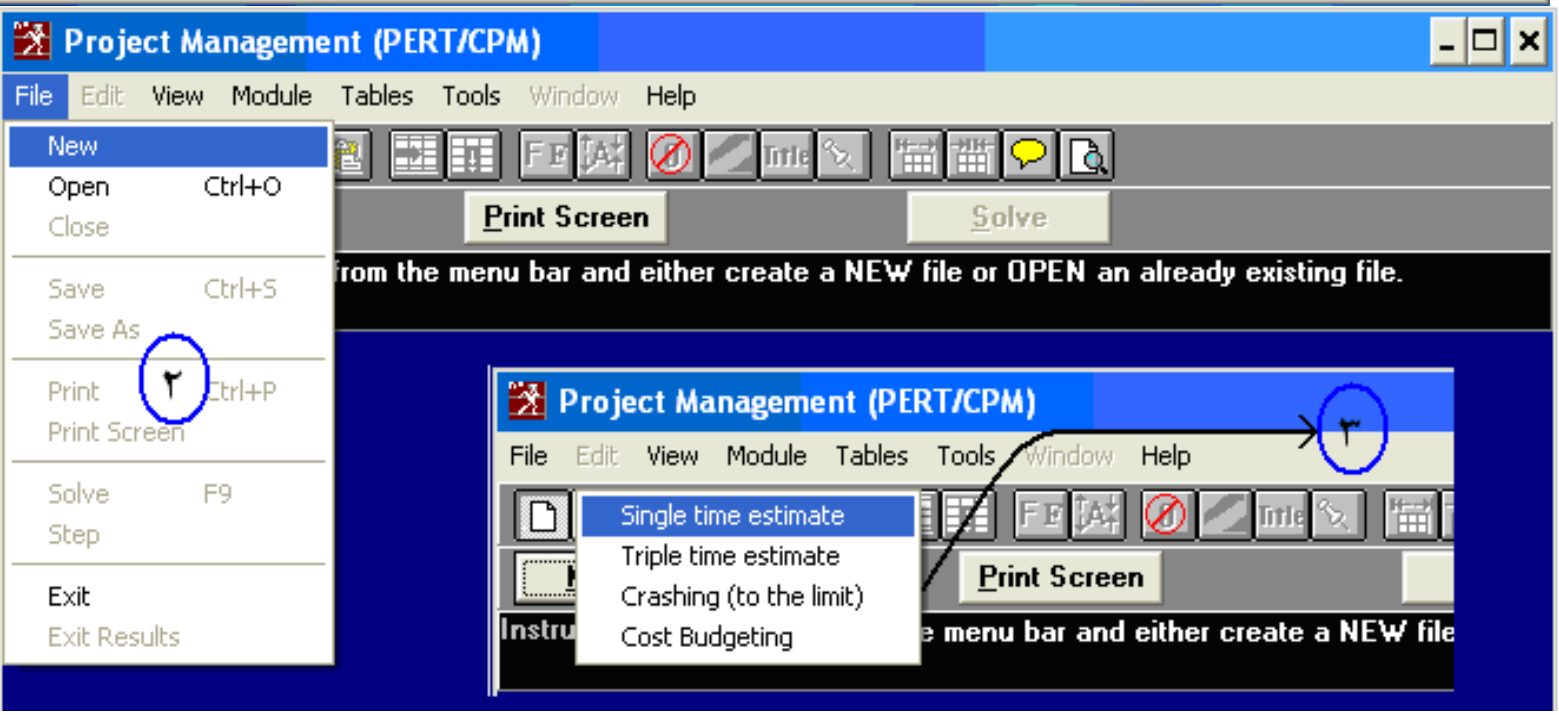
در روش Trip time estimate علاوه بر نام گروه مبدا و مقصد هر فعالیت زمانهای خوش بینانه و بدبینانه و متحمل هر فعالیت را نیز وارد می کنیم

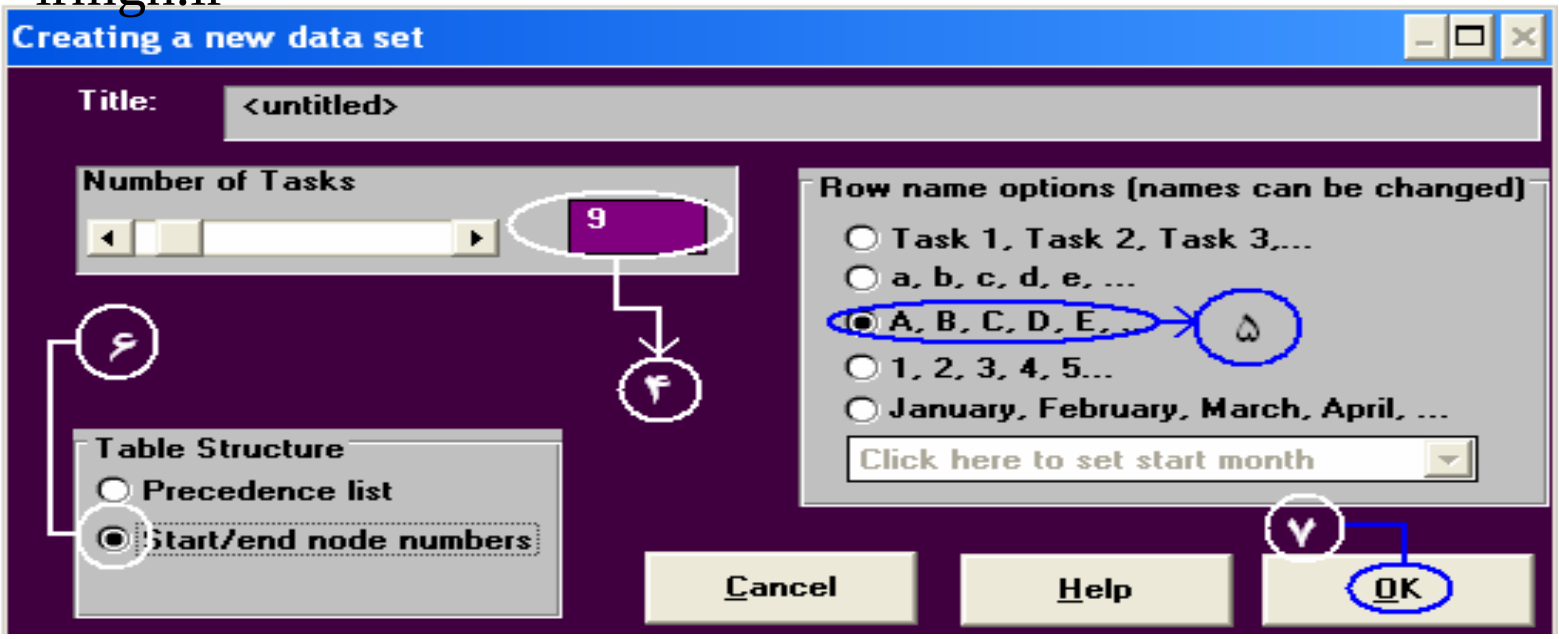
Crashing (to the limit) همان موازنه زمان و هزینه می باشد علاوه بر گروه مبدا و مقصد هر فعالیت و زمان هر فعالیت زمان فشرده Crash time هزینه نرمالNormal Cost و هزینه فشردهCrash time را وارد کنیم

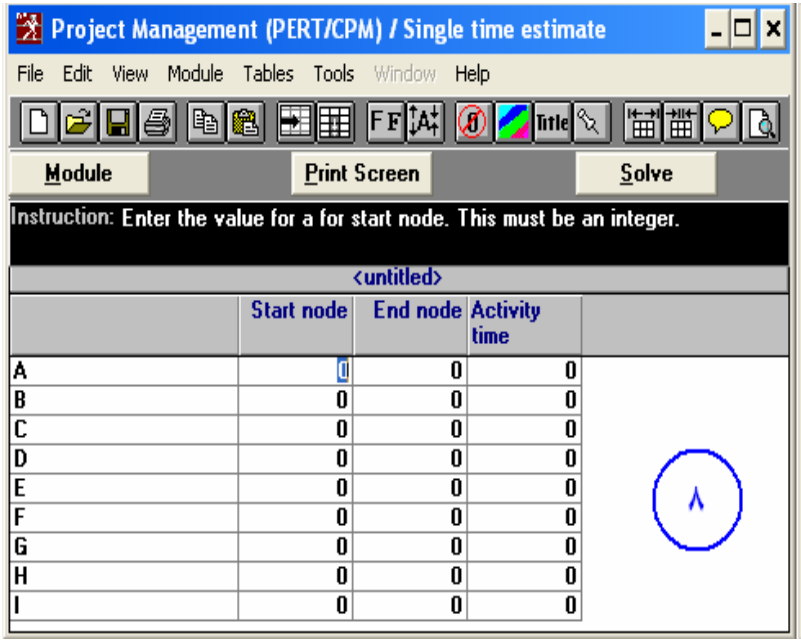


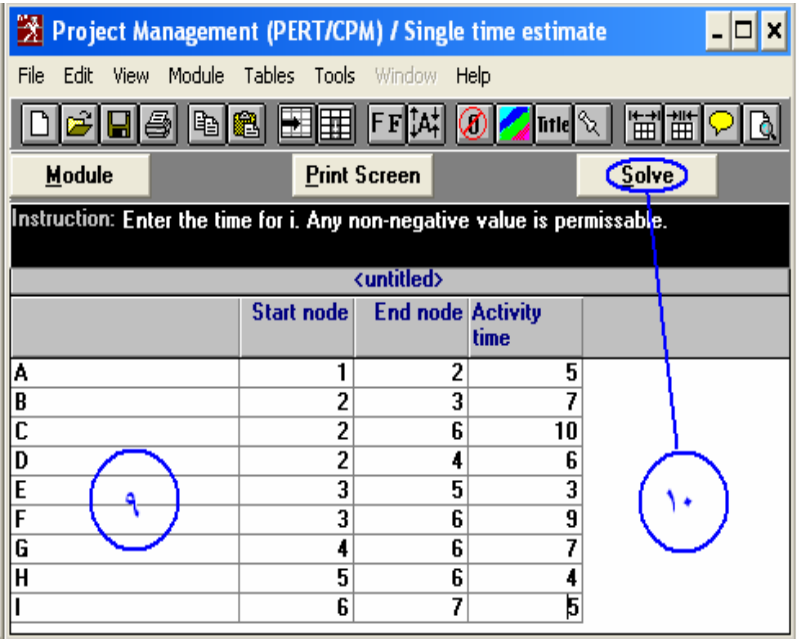
Cost Budgeting که موازنه زمان و هزینه در حالت مشخص بودن تاریخ پروژه می باشد باید گره شروع و پایان و همینطور زمان و هزینه نرمال را نیزرا مشخص کنیم


Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
Modules
POM and QM
Assignment
Breakeven/Cost-Volume Analy
Decision Analysis
Forecasting
Inventory
Linear Programming
Material Requirements Plannin
Project Management (PERT/C
Quality Control
Simulation
Transportation
Waiting Lines
POM Only
Aggregate Planning
Balancing, Assembly Line
Learning curves
Location
Lot Sizing
Job Shop Scheduling
Operations Layout
Reliability
۱
QM Only
Game Theory
Goal Programming
Integer Programming
Markov Analysis
Mixed Integer Programming
Networks
Cancel


Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
New
Open Ctrl+O
Close
Save Ctrl+S
Save As
Print Ctrl+P
Print Screen
Solve F9
Step
Exit
Exit Results
۲
Print Screen
Solve
rom the menu bar and either create a NEW file or OPEN an already existing file.
Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
۳
Single time estimate
Triple time estimate
Crashing (to the limit)
Cost Budgeting
Print Screen
menu bar and either create a NEW file


Creating a new data set
Title:
<untitled>
Number of Tasks
9
۴
۶
Table Structure
Precedence list
Start/end node numbers
Row name options (names can be changed)
Task 1, Task 2, Task 3,...
a, b, c, d, e, ...
A, B, C, D, E, ...
۵
1, 2, 3, 4, 5...
January, February, March, April, ...
Click here to set start month
۷
Cancel
Help
OK


Project Management (PERT/CPM) / Single time estimate
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
Instruction: Enter the value for a for start node. This must be an integer.
<untitled>
Start node
End node
Activity time
A 0 0 0
B 0 0 0
C 0 0 0
D 0 0 0
E 0 0 0
F 0 0 0
G 0 0 0
H 0 0 0
I 0 0 0
۸


Project Management (PERT/CPM) / Single time estimate
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
Instruction: Enter the time for i. Any non-negative value is permissable.
<untitled>
Start node
End node
Activity time
A 1 2 5
B 2 3 7
C 2 6 10
D 2 4 6
E 3 5 3
F 3 6 9
G 4 6 7
H 5 6 4
I 6 7 5
۹
۱۰

Project Management (PERT/CPM) / Single time estimate

File Edit View Module Tables Tools Window Help

Cascade
Tile
Data (edit)
1 Project Management (PERT/CPM) Results
2 Charts

Module

Instruction: There are more results ava... opened by double clicking or using the WINDOW option in the...

Network type
Precedence list
Start/end node numbers

Method
Single time estimate

Project Management (PERT/CPM) Results

<untitled> Solution

	Star node	End node	Activity time	Early Start	Early Finish	Late Start	Late Finish	Slack
Project			26.					
A	1.	2.	5.	0.	5.	0.	5.	0.
B	2.	3.	7.	5.	12.	5.	12.	0.
C	2.	6.	10.	5.	15.	11.	21.	6.
D	2.	4.	6.	5.	11.	8.	14.	3.
E	3.	5.	3.	12.	15.	14.	17.	2.
F	3.	6.	9.	12.	21.	12.	21.	0.
G	4.	6.	7.	11.	18.	14.	21.	3.
H	5.	6.	4.	15.	19.	17.	21.	2.
I	6.	7.	5.	21.	26.	21.	26.	0.

١١

Charts

Project Management (PERT/CPM) / Single time estimate - [Charts]

File Graphs Background Window Help

Module Print Screen Edit Data

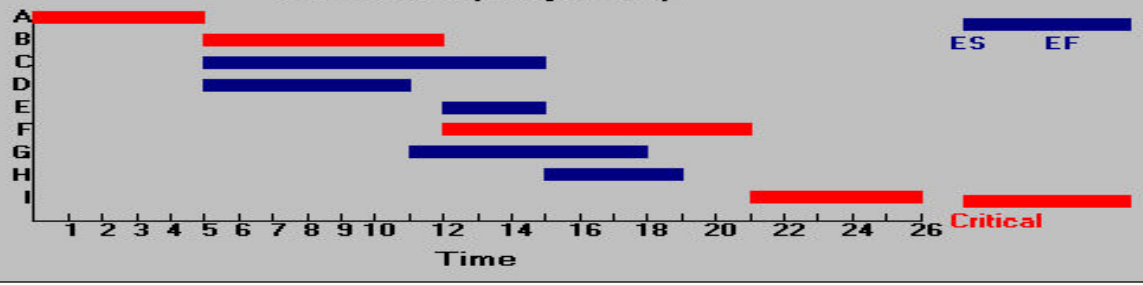
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW. Go to GRAPHS to see other graphs.

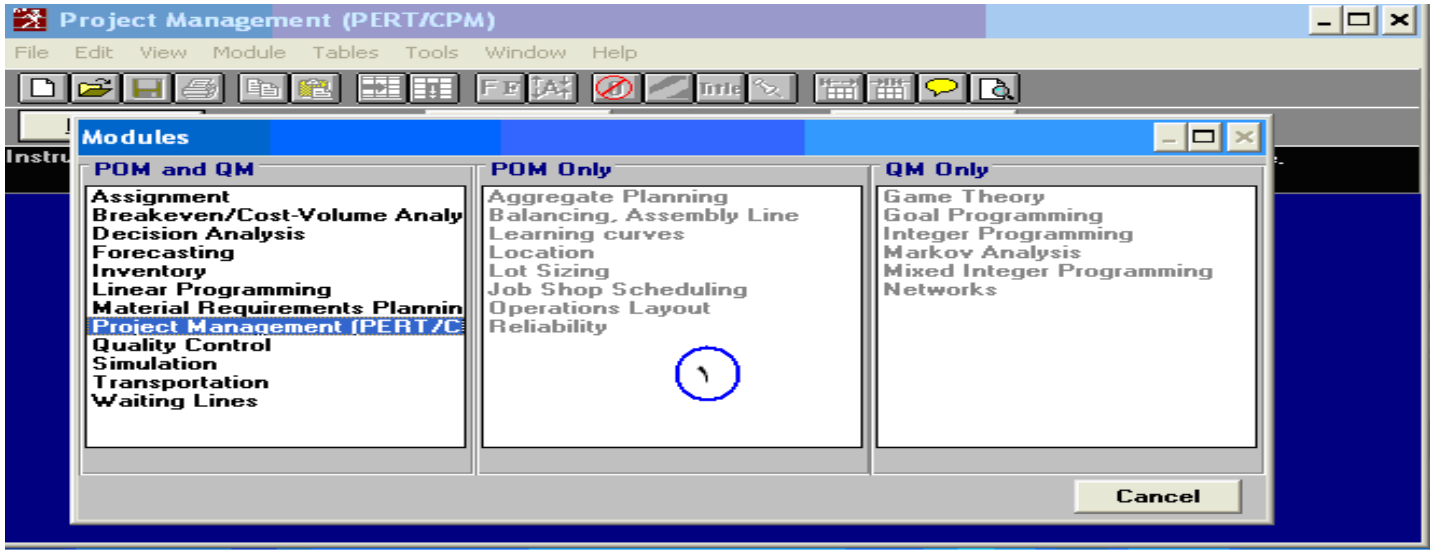
Network type
Precedence list
Start/end node numbers

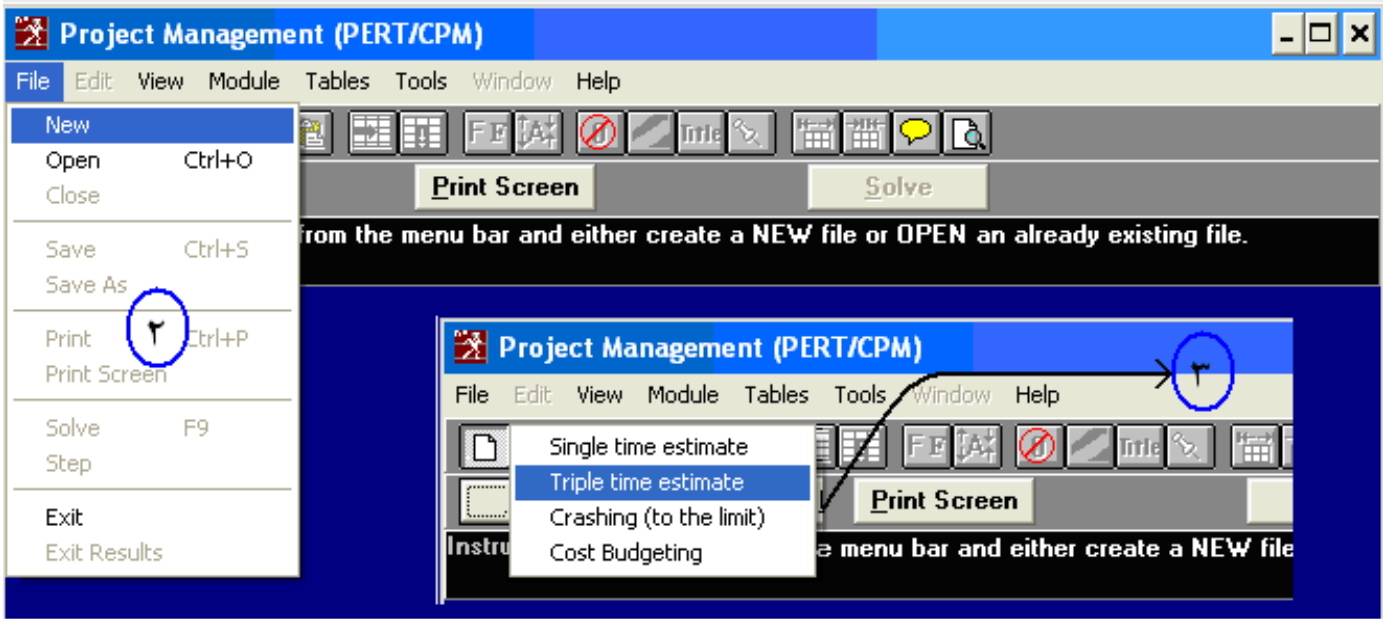
Method
Single time estimate

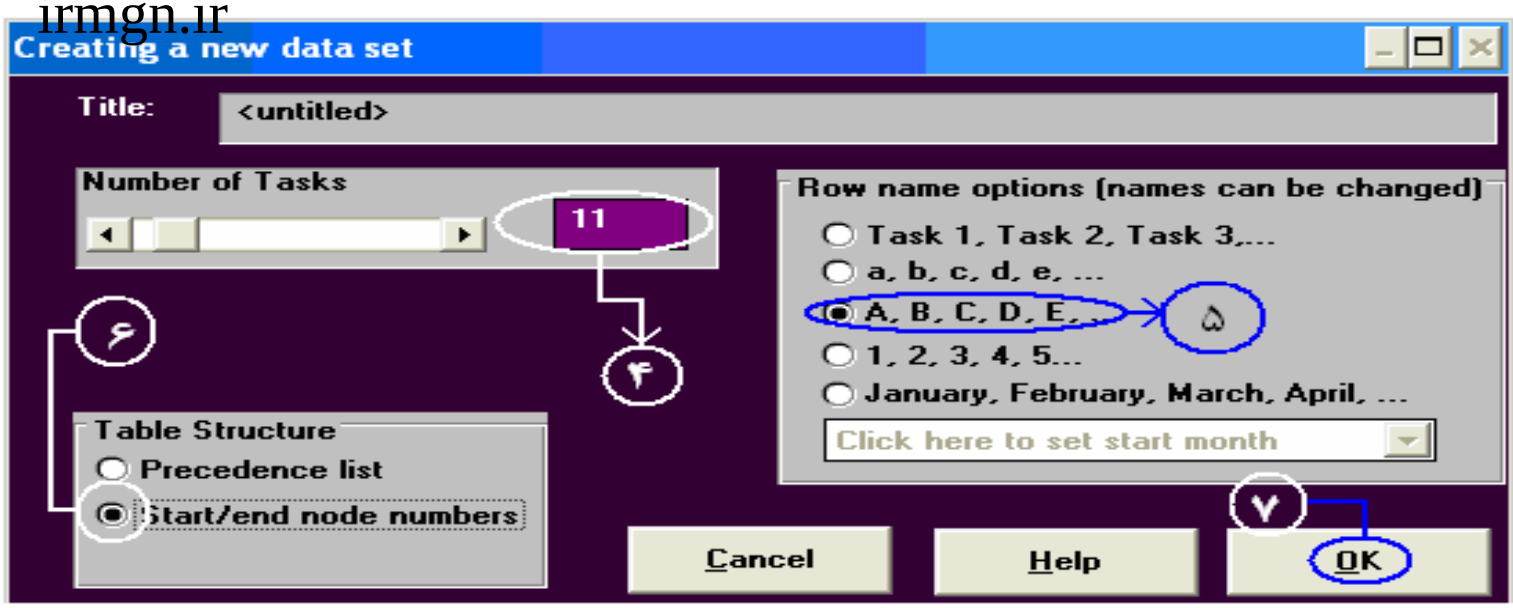
١٢

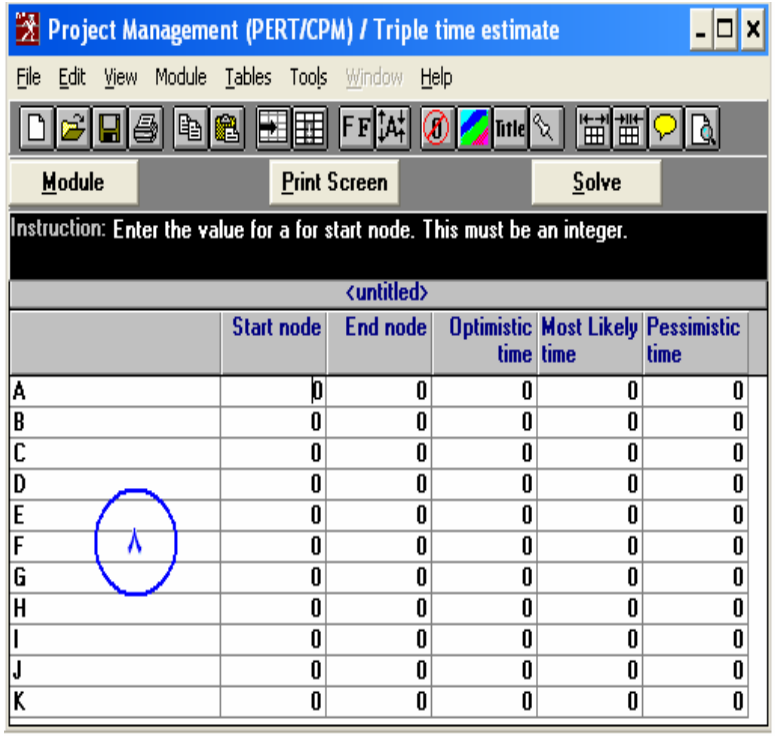
<untitled>
Gantt Chart (Early times)




Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
Modules
POM and QM
Assignment
Breakeven/Cost-Volume Analy
Decision Analysis
Forecasting
Inventory
Linear Programming
Material Requirements Plannin
Project Management (PERT/C
Quality Control
Simulation
Transportation
Waiting Lines
POM Only
Aggregate Planning
Balancing, Assembly Line
Learning curves
Location
Lot Sizing
Job Shop Scheduling
Operations Layout
Reliability
١
QM Only
Game Theory
Goal Programming
Integer Programming
Markov Analysis
Mixed Integer Programming
Networks
Cancel

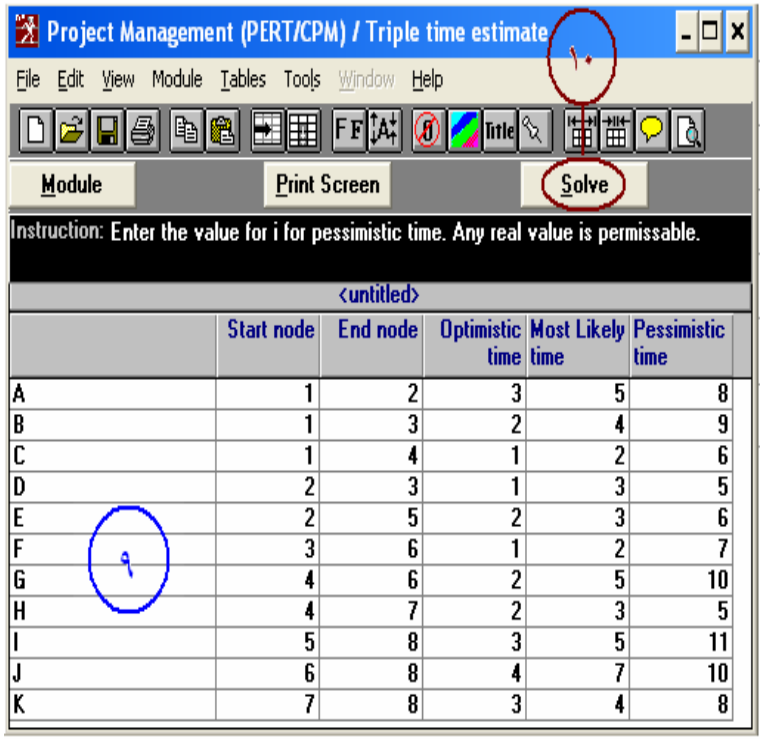

Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
New
Open Ctrl+O
Close
Save Ctrl+S
Save As
Print Ctrl+P
Print Screen
Solve F9
Step
Exit
Exit Results
٢
Print Screen
Solve
rom the menu bar and either create a NEW file or OPEN an already existing file.
Project Management (PERT/CPM)
File Edit View Module Tables Tools Window Help
٣
Single time estimate
Triple time estimate
Crashing (to the limit)
Cost Budgeting
Print Screen
e menu bar and either create a NEW file





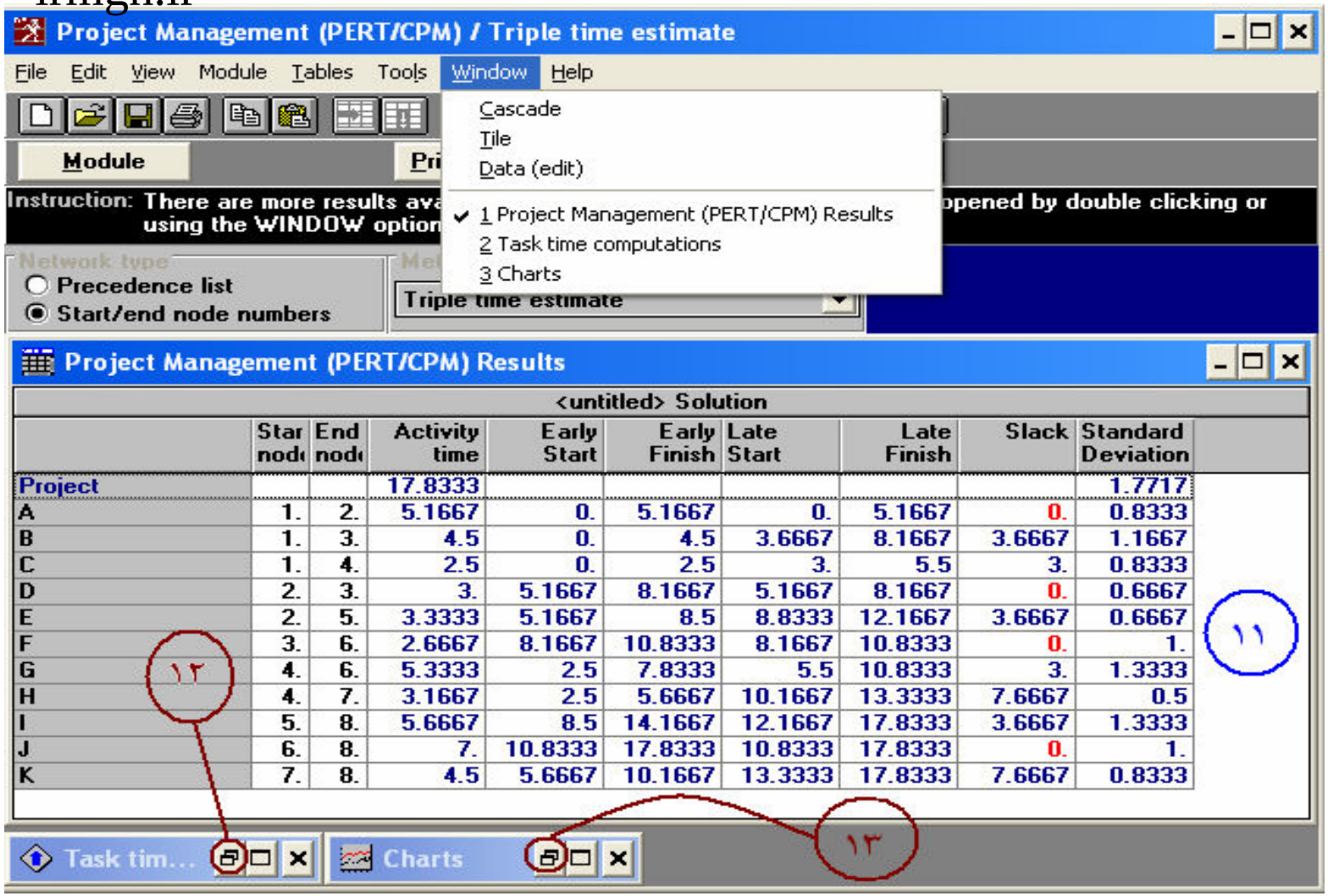
<untitled>

	Start node	End node	Optimistic time	Most Likely time	Pessimistic time
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0



<untitled>

	Start node	End node	Optimistic time	Most Likely time	Pessimistic time
A	1	2	3	5	8
B	1	3	2	4	9
C	1	4	1	2	6
D	2	3	1	3	5
E	2	5	2	3	6
F	3	6	1	2	7
G	4	6	2	5	10
H	4	7	2	3	5
I	5	8	3	5	11
J	6	8	4	7	10
K	7	8	3	4	8


Project Management (PERT/CPM) / Triple time estimate
File Edit View Module Tables Tools Window Help
Cascade
Tile
Data (edit)
1 Project Management (PERT/CPM) Results
2 Task time computations
3 Charts
Module
Instruction: There are more results ava
using the WINDOW option
opened by double clicking or
Network type
Precedence list
Start/end node numbers
Triple time estimate
Project Management (PERT/CPM) Results
<untitled> Solution
Star node
End node
Activity time
Early Start
Early Finish
Late Start
Late Finish
Slack
Standard Deviation
Project 17.8333 1.7717
A 1. 2. 5.1667 0. 5.1667 0. 5.1667 0. 0.8333
B 1. 3. 4.5 0. 4.5 3.6667 8.1667 3.6667 1.1667
C 1. 4. 2.5 0. 2.5 3. 5.5 3. 0.8333
D 2. 3. 3. 5.1667 8.1667 5.1667 8.1667 0. 0.6667
E 2. 5. 3.3333 5.1667 8.5 8.8333 12.1667 3.6667 0.6667
F 3. 6. 2.6667 8.1667 10.8333 8.1667 10.8333 0. 1.
G 4. 6. 5.3333 2.5 7.8333 5.5 10.8333 3. 1.3333
H 4. 7. 3.1667 2.5 5.6667 10.1667 13.3333 7.6667 0.5
I 5. 8. 5.6667 8.5 14.1667 12.1667 17.8333 3.6667 1.3333
J 6. 8. 7. 10.8333 17.8333 10.8333 17.8333 0. 1.
K 7. 8. 4.5 5.6667 10.1667 13.3333 17.8333 7.6667 0.8333
۱۱
۱۲
۱۳
Task tim...
Charts

Project Management (PERT/CPM) / Triple time estimate - [Task time computations]

File Edit View Module Tables Tools Window Help

Module | Print Screen | Edit Data

Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.

Network type
- Precedence list
- Start/end node numbers

Method: Triple time estimate

<untitled> Solution

	Start node	End node	Optimistic time	Most Likely time	Pessimistic time	Activity time	Standard Deviation	Variance
A	1.	2.	3.	5.	8.	5.1667	0.8333	0.6944
B	1.	3.	2.	4.	9.	4.5	1.1667	1.3611
C	1.	4.	1.	2.	6.	2.5	0.8333	0.6944
D	2.	3.	1.	3.	5.	3.	0.6667	0.4444
E	2.	5.	2.	3.	6.	3.3333	0.6667	0.4444
F	3.	6.	1.	2.	7.	2.6667	1.	1.
G	4.	6.	2.	5.	10.	5.3333	1.3333	1.7778
H	4.	7.	2.	3.	5.	3.1667	0.5	0.25
I	5.	8.	3.	5.	11.	5.6667	1.3333	1.7778
J	6.	8.	4.	7.	10.	7.	1.	1.
K	7.	8.	3.	4.	8.	4.5	0.8333	0.6944
Project results								
Total of critical								3.1389
Square root of total							1.7717	

Project Management (PERT/CPM) / Triple time estimate - [Charts]

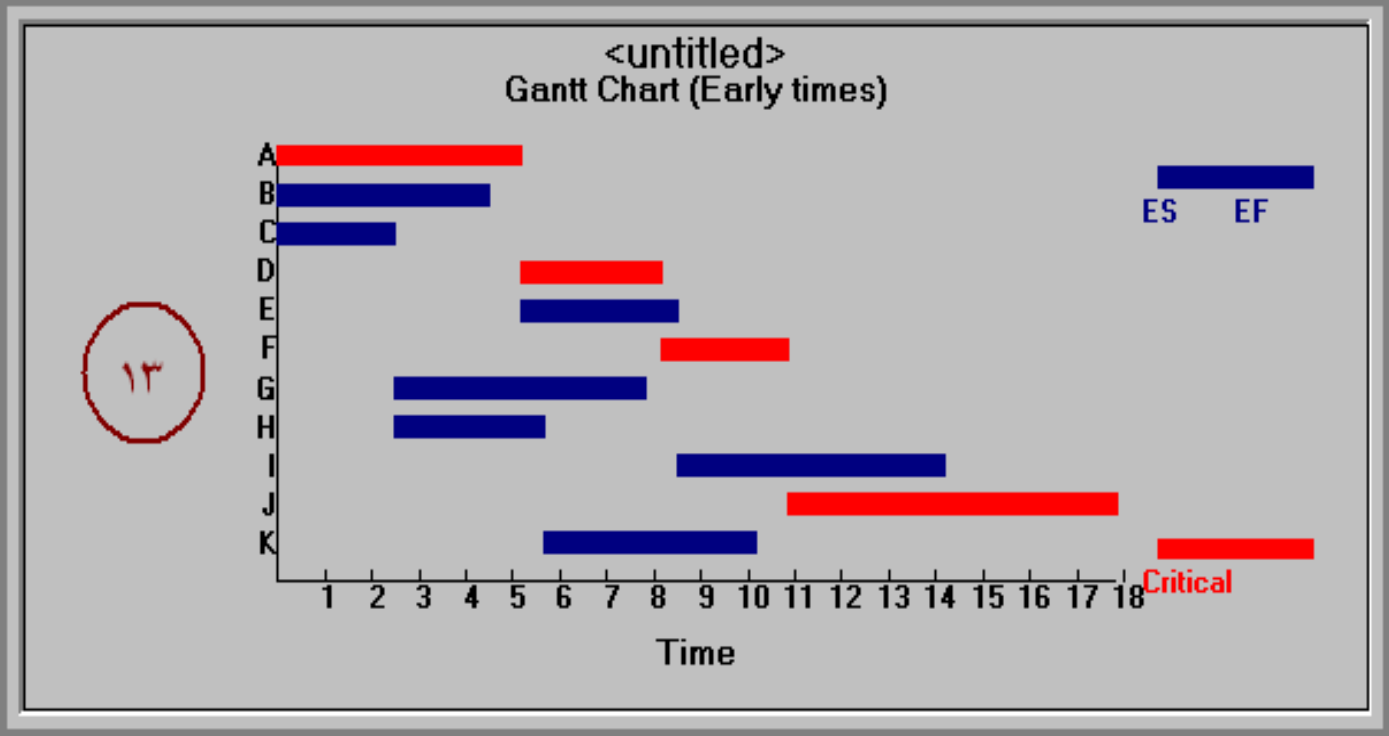
File Graphs Background Window Help

Module Print Screen Edit Data

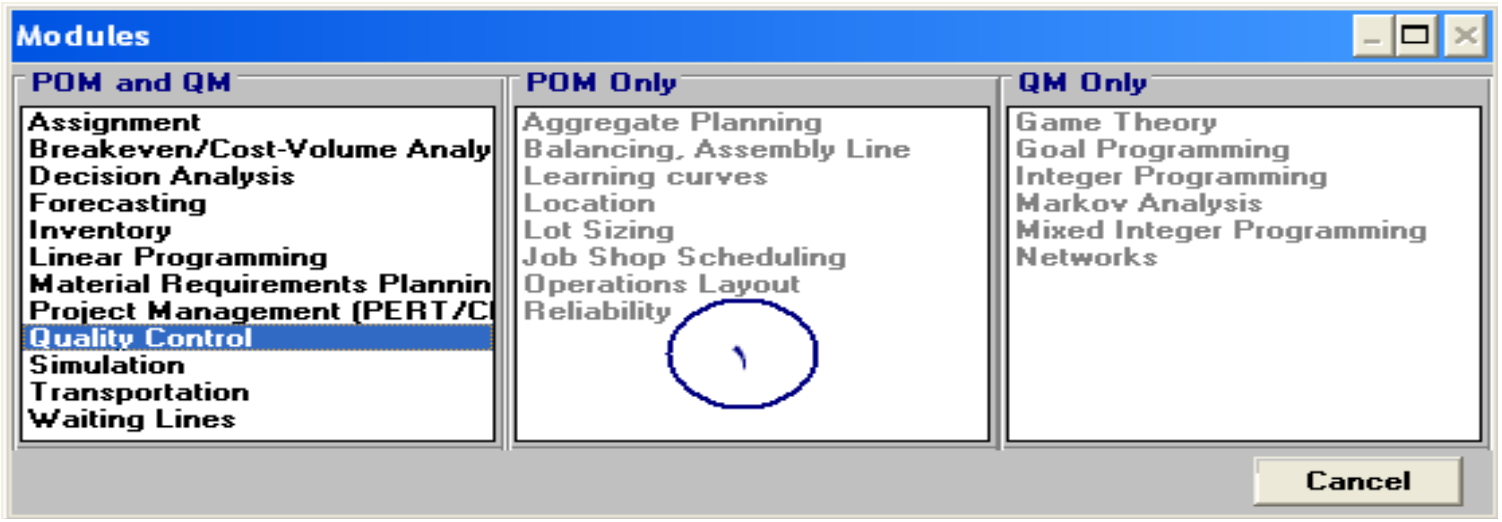
Instruction: The graph can be enlarged using WINDOW from the menu. Other output can be viewed by using WINDOW. Go to GRAPHS to see other graphs.

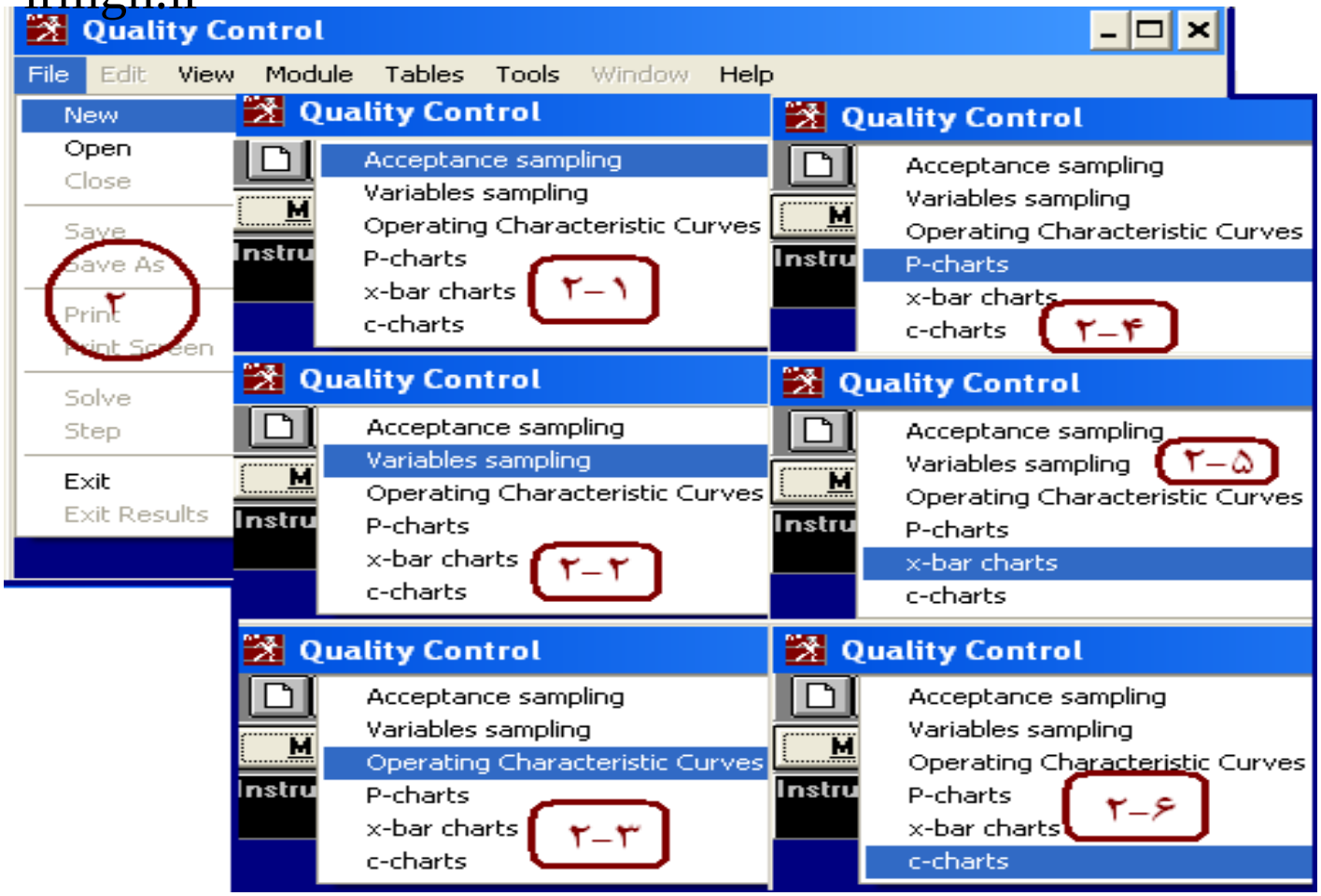
Network type
- Precedence list
- Start/end node numbers

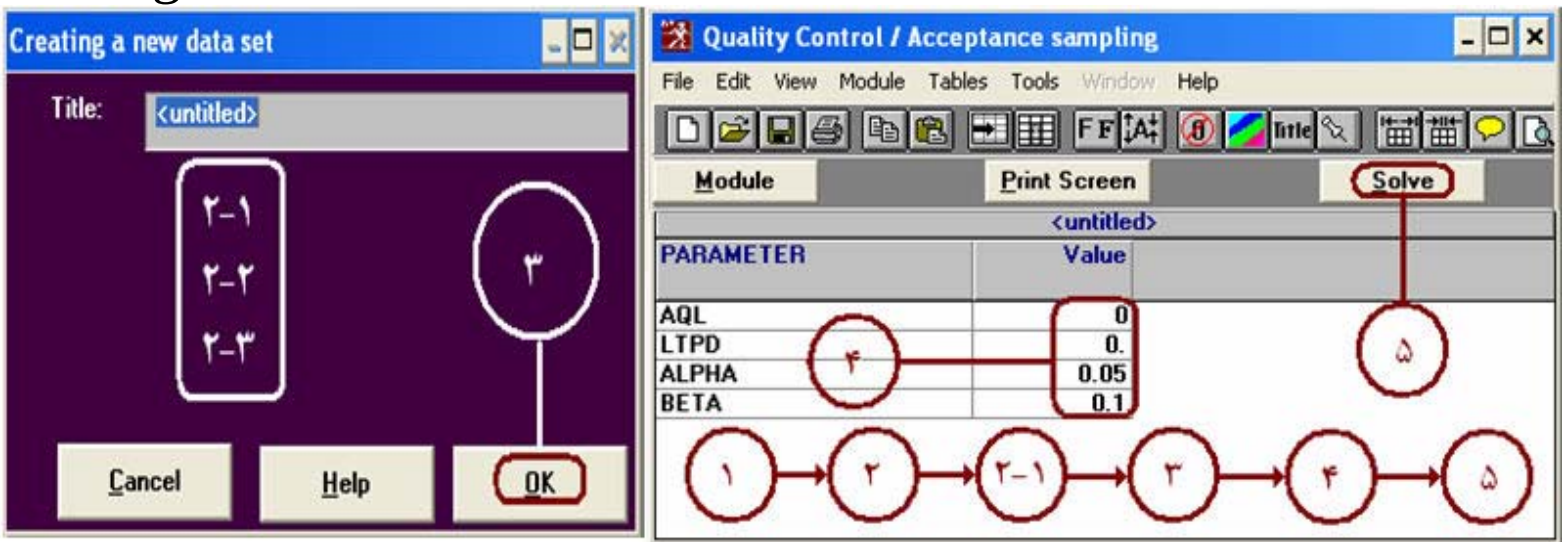
Method: Triple time estimate

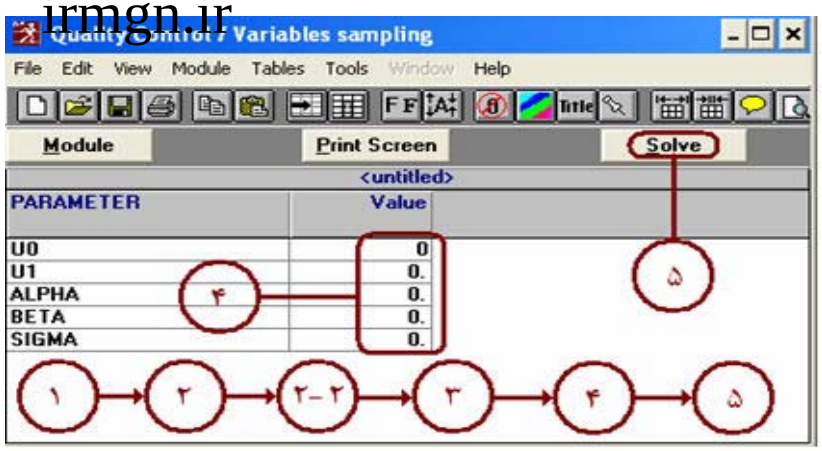


Quality Control 9-1 :کنترل کیفیت




Quality Control
File Edit View Module Tables Tools Window Help
New
Open
Close
Save
Save As
Print
Print Screen
Solve
Step
Exit
Exit Results
۲
Quality Control
Acceptance sampling
Variables sampling
Operating Characteristic Curves
P-charts
x-bar charts
c-charts
۲-۱
Quality Control
Acceptance sampling
Variables sampling
Operating Characteristic Curves
P-charts
x-bar charts
c-charts
۲-۴
Quality Control
Acceptance sampling
Variables sampling
Operating Characteristic Curves
P-charts
x-bar charts
c-charts
۲-۲
Quality Control
Acceptance sampling
Variables sampling
Operating Characteristic Curves
P-charts
x-bar charts
c-charts
۲-۵
Quality Control
Acceptance sampling
Variables sampling
Operating Characteristic Curves
P-charts
x-bar charts
c-charts
۲-۳
Quality Control
Acceptance sampling
Variables sampling
Operating Characteristic Curves
P-charts
x-bar charts
c-charts
۲-۶


Creating a new data set
Title:
<untitled>
۲-۱
۲-۲
۲-۳
۳
Cancel
Help
OK
Quality Control / Acceptance sampling
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
<untitled>
PARAMETER
Value
AQL 0
LTPD 0.
ALPHA 0.05
BETA 0.1
۴
۵
۱ ۲ ۲-۱ ۳ ۴ ۵


Quality Control / Variables sampling
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
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PARAMETER
Value
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ALPHA
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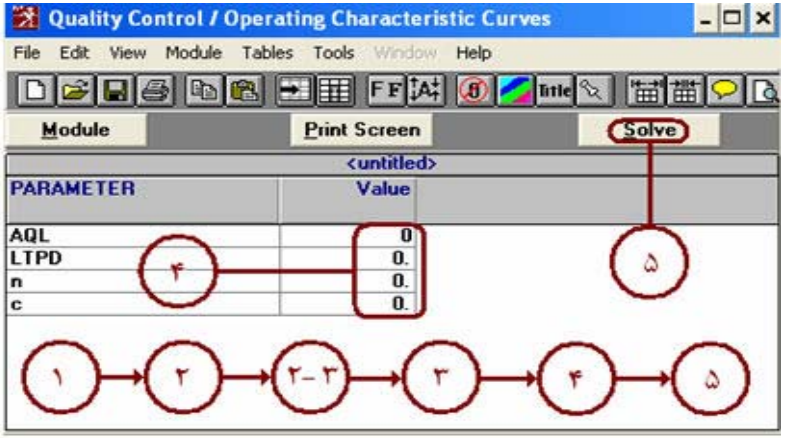
Quality Control / Operating Characteristic Curves
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
<untitled>
PARAMETER
Value
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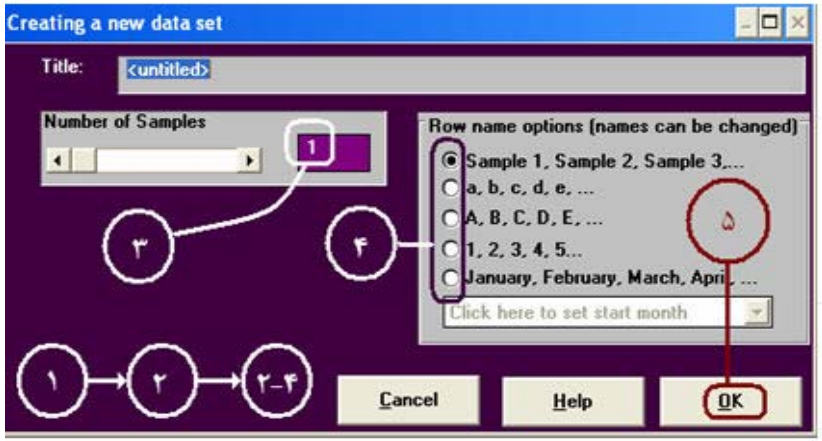
Creating a new data set
Title:
<untitled>
Number of Samples
1
Row name options (names can be changed)
Sample 1, Sample 2, Sample 3,...
a, b, c, d, e, ...
A, B, C, D, E, ...
1, 2, 3, 4, 5...
January, February, March, Apri, ...
Click here to set start month
Cancel
Help
OK
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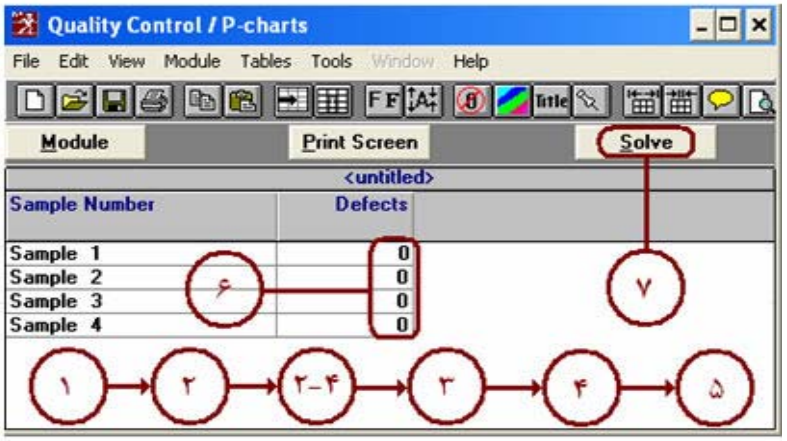
Quality Control / P-charts
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
<untitled>
Sample Number
Defects
Sample 1
Sample 2
Sample 3
Sample 4
0
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0
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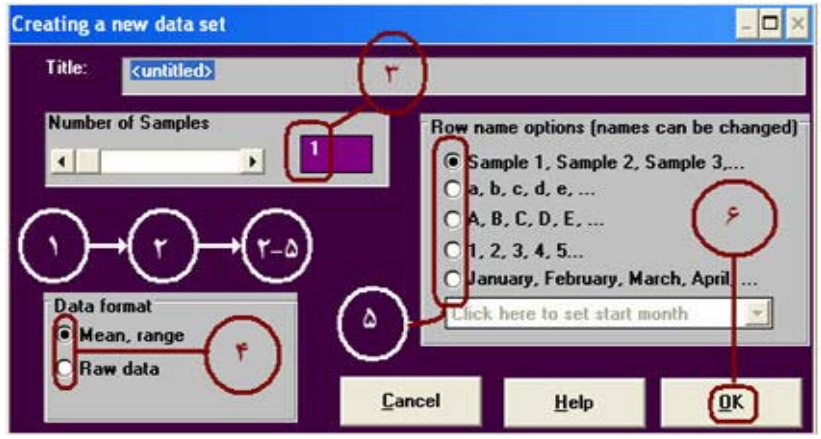
Creating a new data set
Title:
<untitled>
۳
Number of Samples
1
Row name options (names can be changed)
Sample 1, Sample 2, Sample 3,...
a, b, c, d, e, ...
A, B, C, D, E, ...
1, 2, 3, 4, 5...
January, February, March, April ...
Click here to set start month
۶
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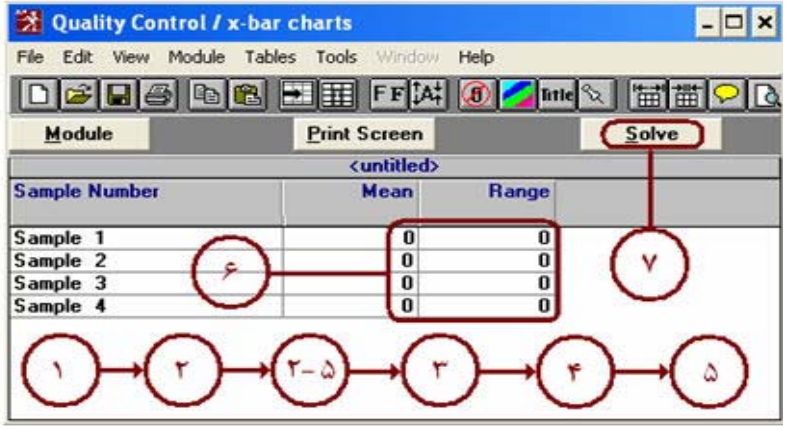
Data format
Mean, range
Raw data
۴
Cancel
Help
OK


Quality Control / x-bar charts
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
<untitled>
Sample Number
Mean
Range
Sample 1
Sample 2
Sample 3
Sample 4
0
0
0
0
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0
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0
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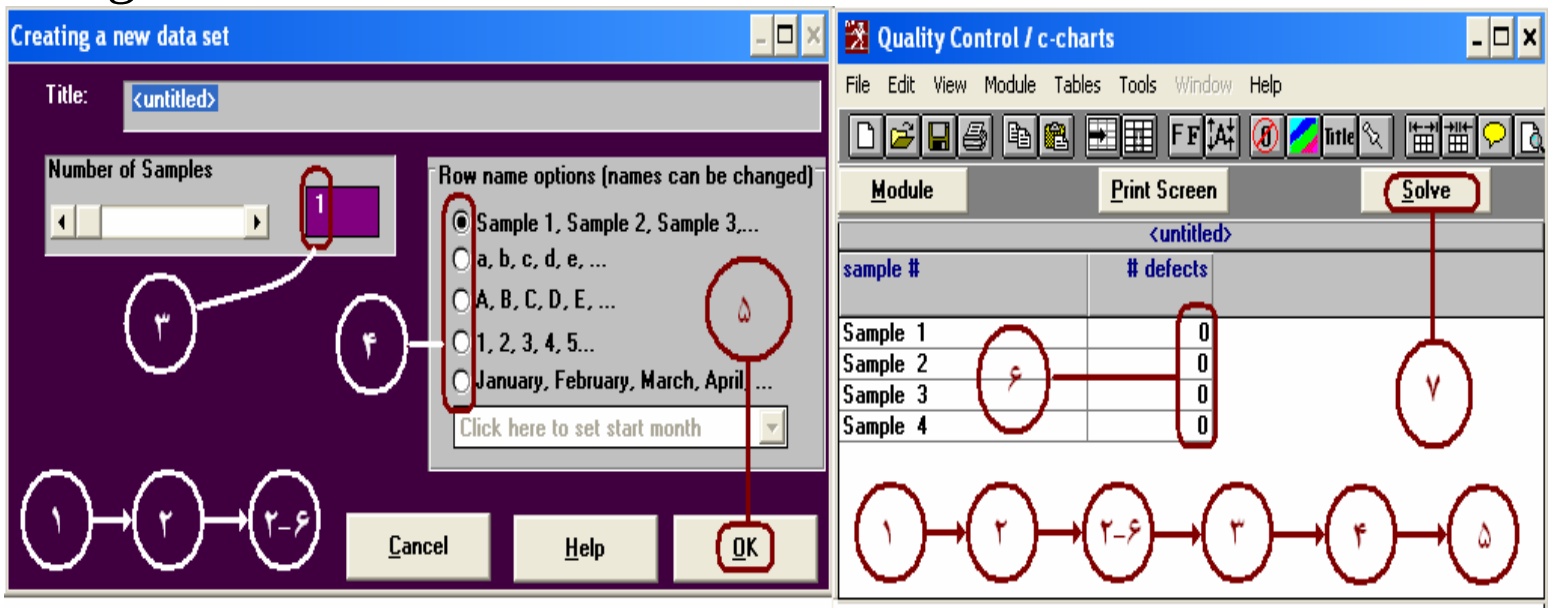
Creating a new data set
Title:
<untitled>
Number of Samples
1
Row name options (names can be changed)
Sample 1, Sample 2, Sample 3,...
a, b, c, d, e, ...
A, B, C, D, E, ...
1, 2, 3, 4, 5...
January, February, March, April ...
Click here to set start month
Cancel
Help
OK
۱
۲
۲-۶
۳
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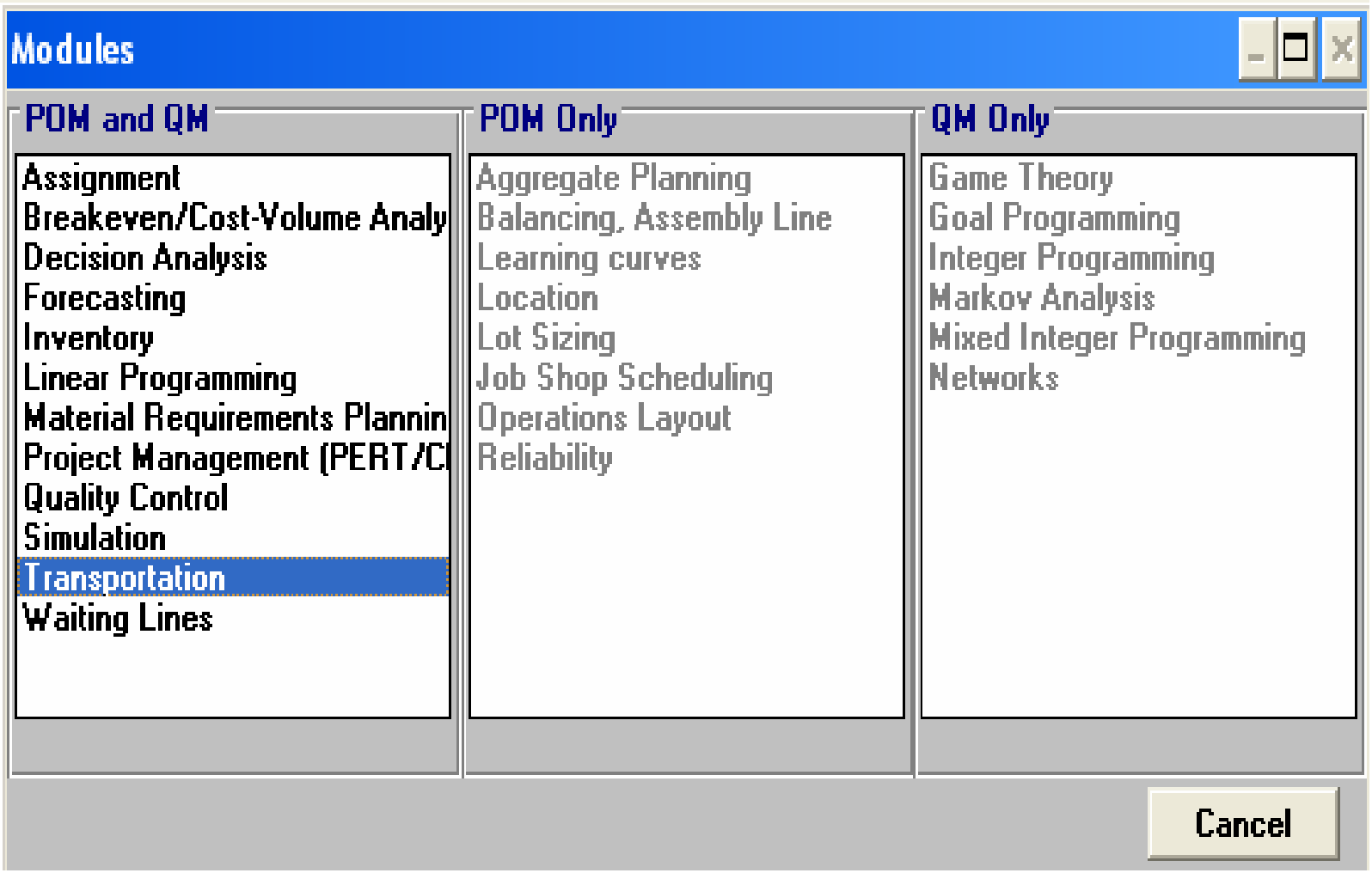
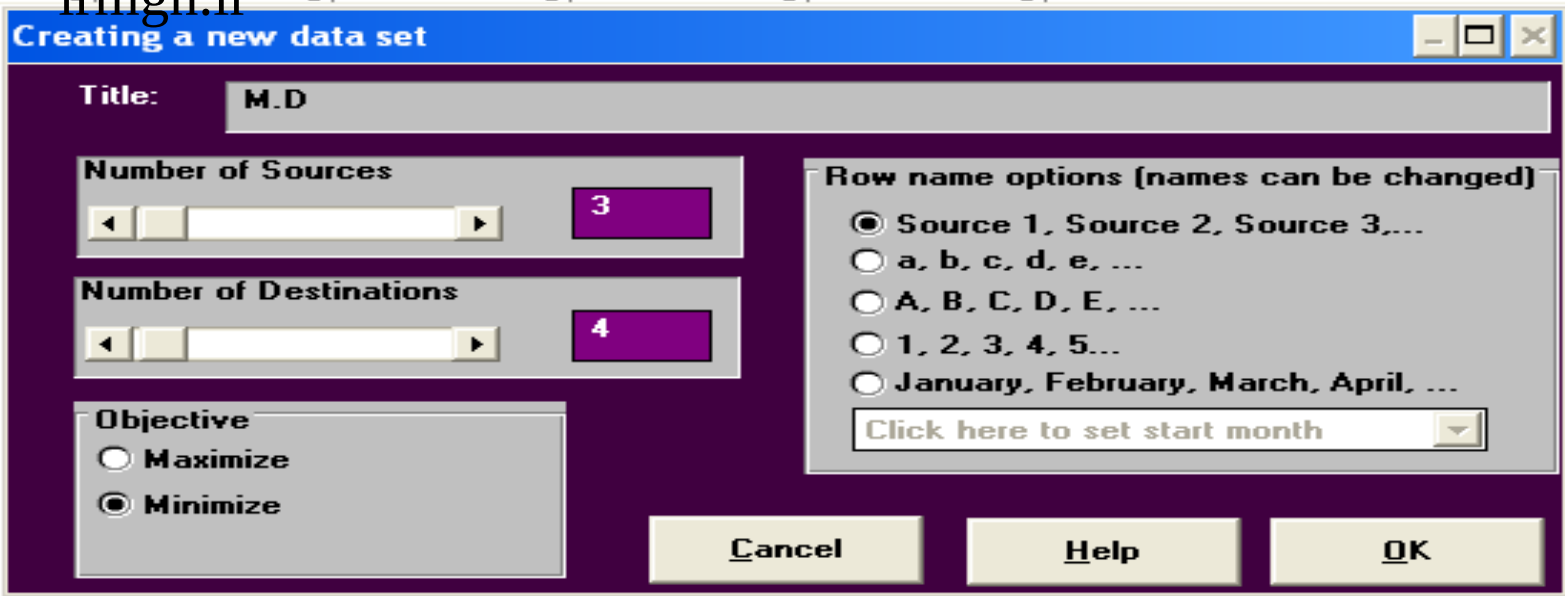
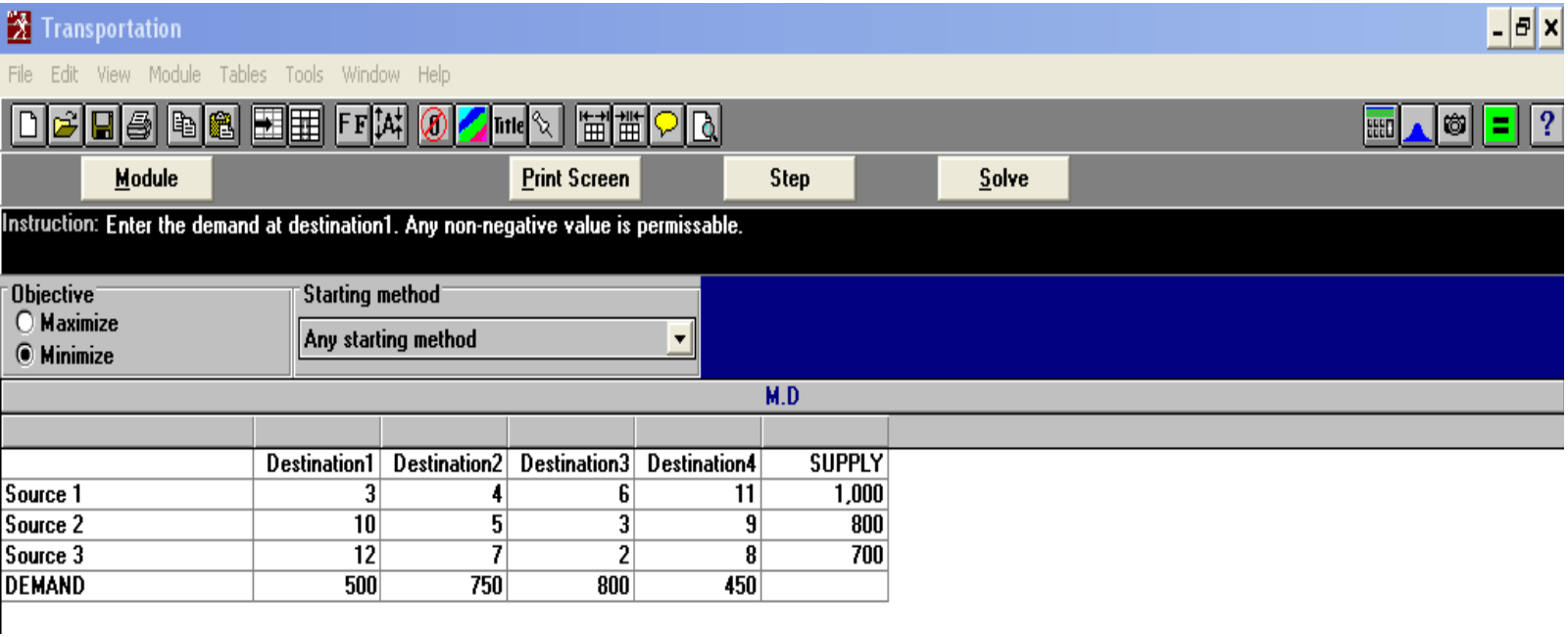
۵
Quality Control / c-charts
File Edit View Module Tables Tools Window Help
Module
Print Screen
Solve
<untitled>
sample #
defects
Sample 1 0
Sample 2 0
Sample 3 0
Sample 4 0
۶
۷
۱
۲
۲-۶
۳
۴
۵

10-1(***simulation***):شبیه سازی

11-1)مدل حمل و نقل(*Transportation*



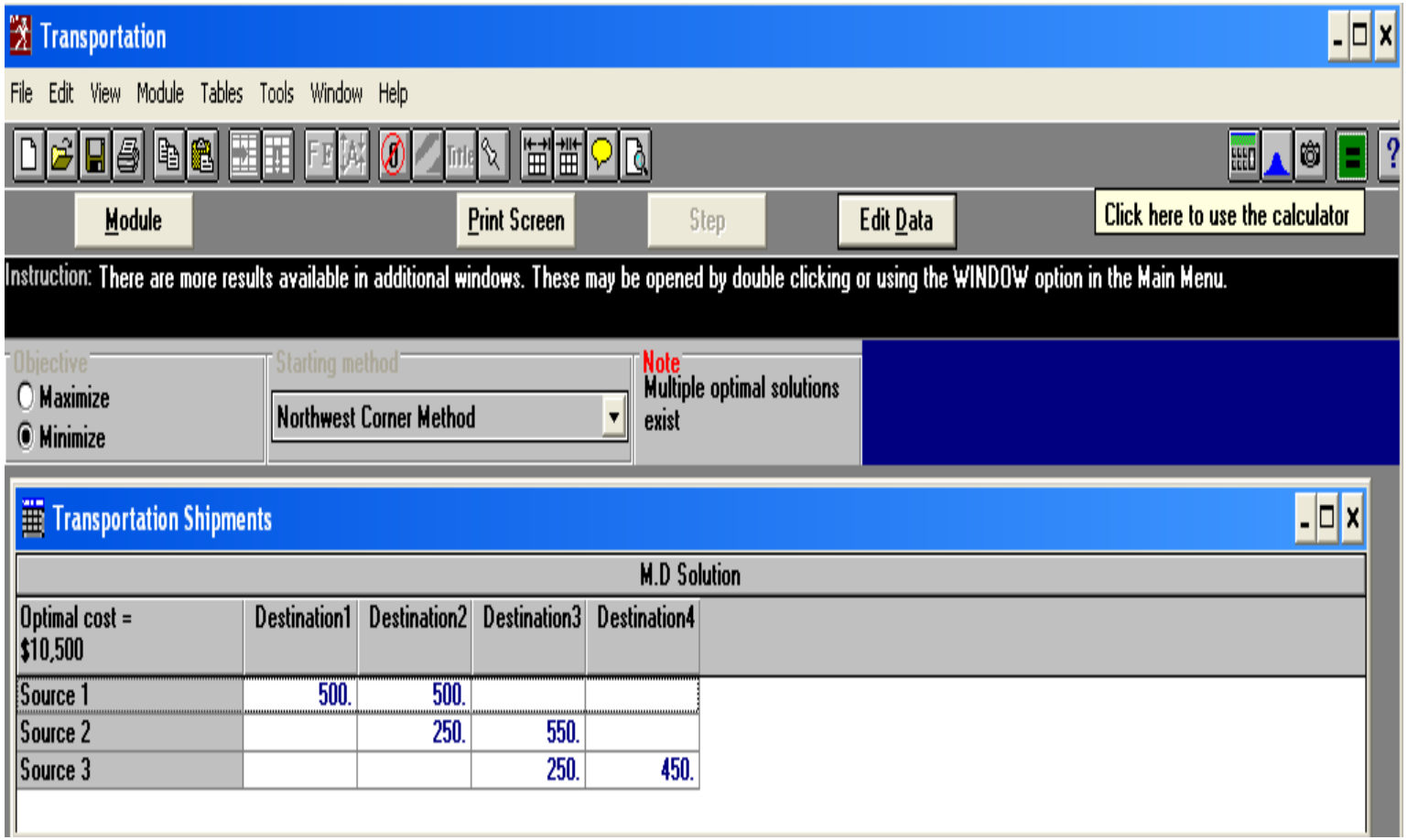


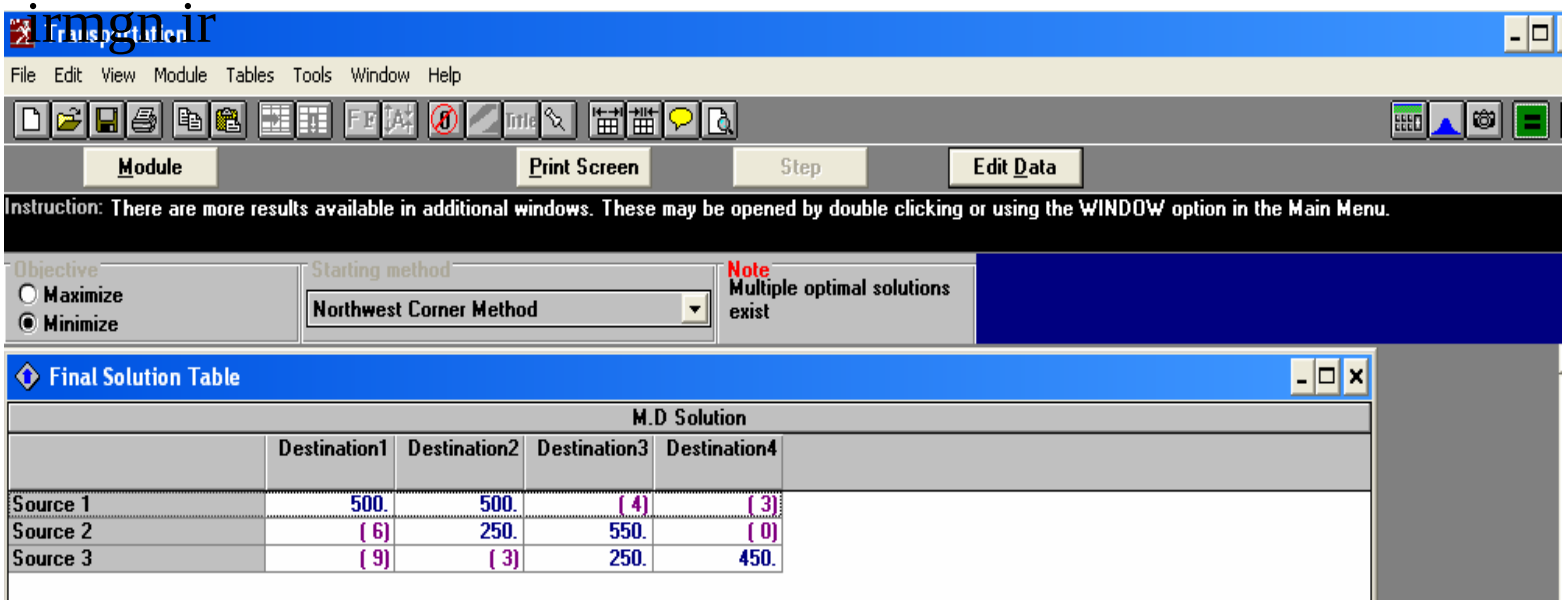


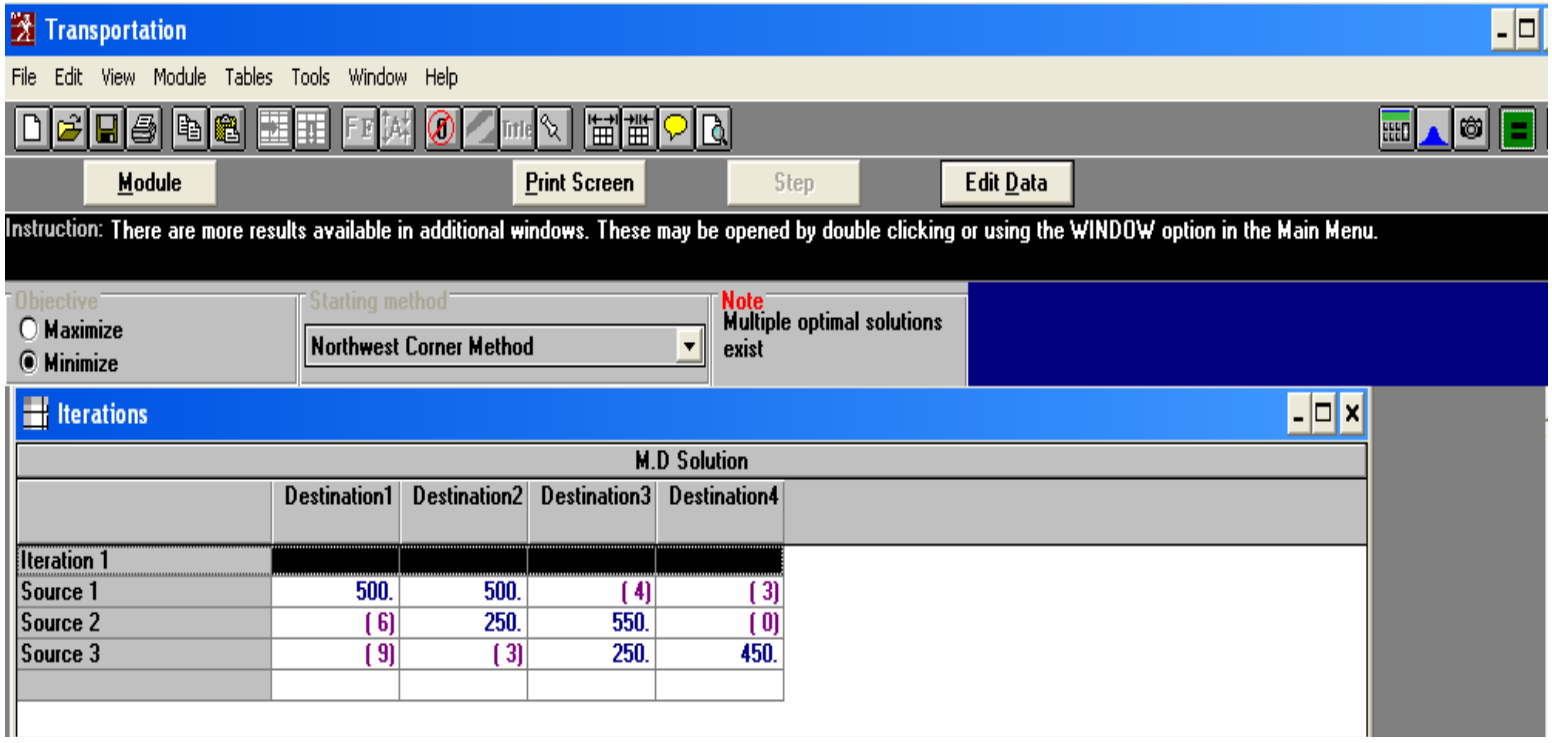
M.D

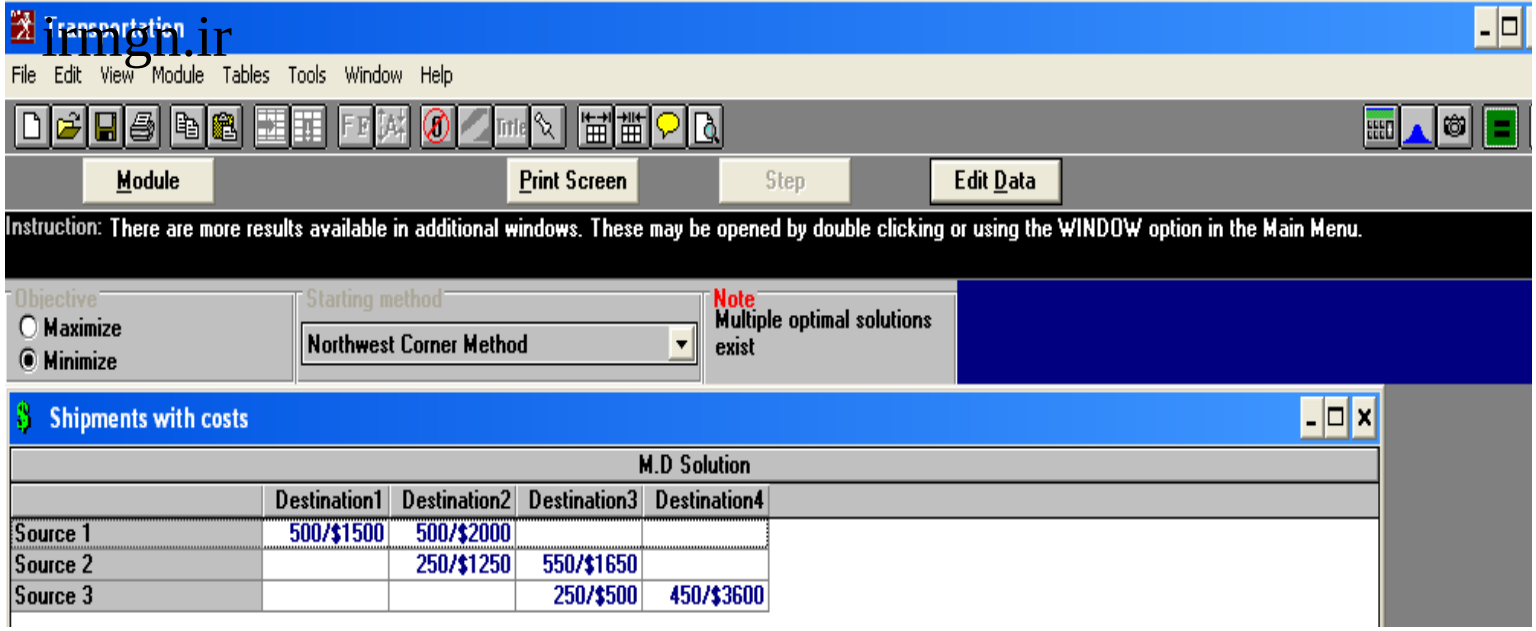
	Destination1	Destination2	Destination3	Destination4	SUPPLY
Source 1	3	4	6	11	1,000
Source 2	10	5	3	9	800
Source 3	12	7	2	8	700
DEMAND	500	750	800	450	

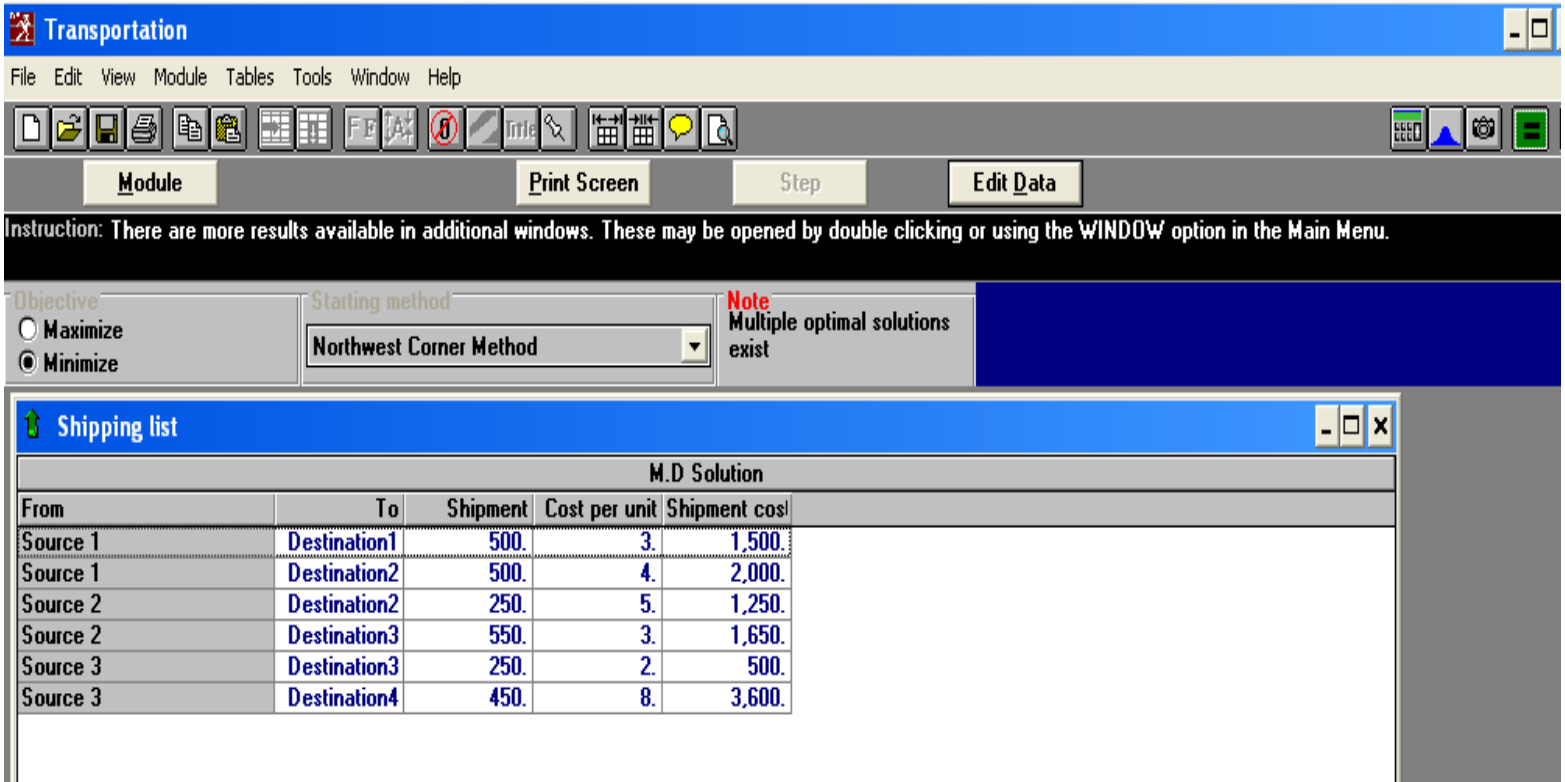
روش گوشه شمال غربی



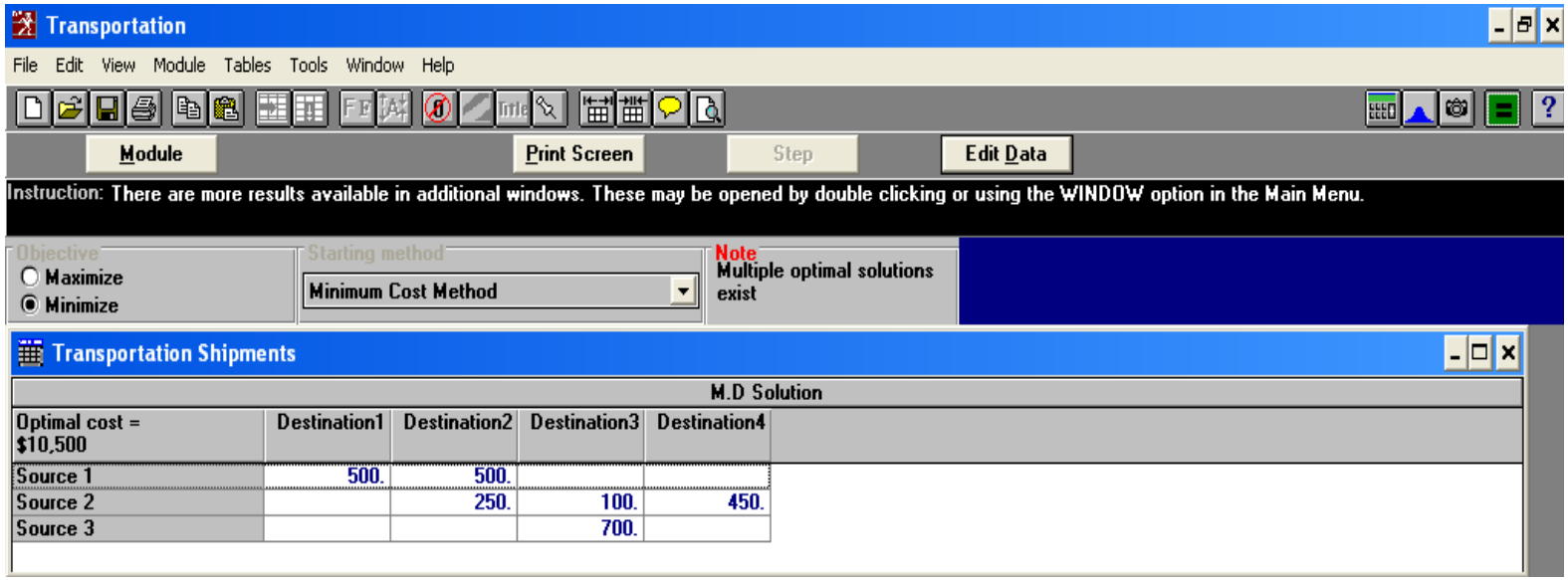

Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Northwest Corner Method
Note
Multiple optimal solutions exist
Final Solution Table
M.D Solution
Destination1 Destination2 Destination3 Destination4
Source 1 500. 500. (4) (3)
Source 2 (6) 250. 550. (0)
Source 3 (9) (3) 250. 450.

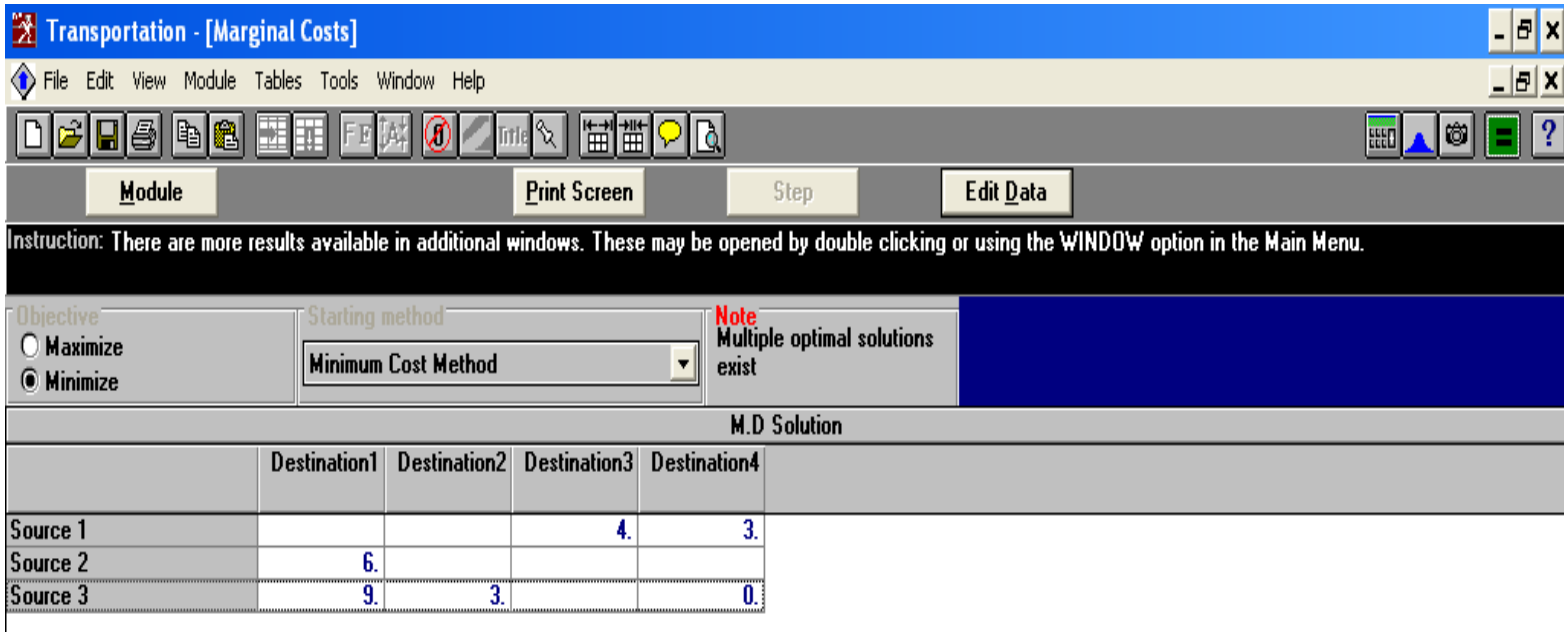

Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Northwest Corner Method
Note
Multiple optimal solutions exist
Iterations
M.D Solution
Destination1 Destination2 Destination3 Destination4
Iteration 1
Source 1 500. 500. (4) (3)
Source 2 (6) 250. 550. (0)
Source 3 (9) (3) 250. 450.

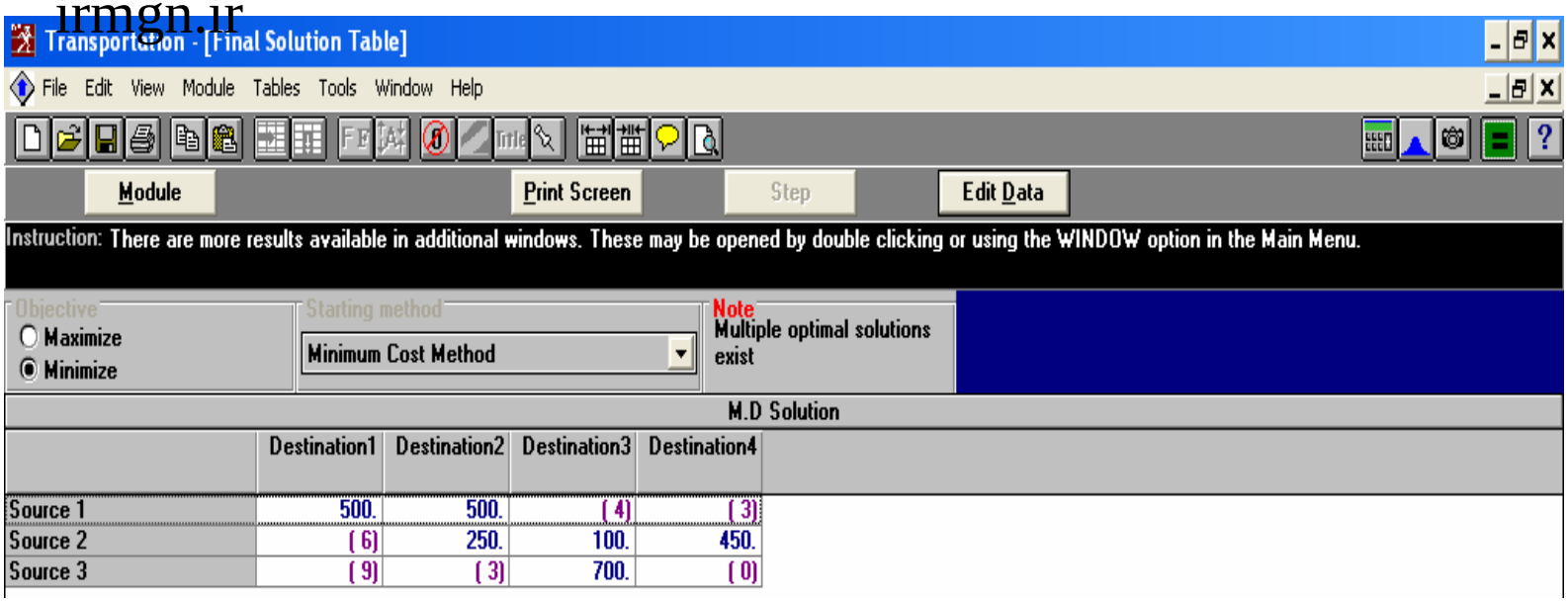

Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Northwest Corner Method
Note
Multiple optimal solutions exist
Shipments with costs
M.D Solution
Destination1 Destination2 Destination3 Destination4
Source 1 500/$1500 500/$2000
Source 2 250/$1250 550/$1650
Source 3 250/$500 450/$3600

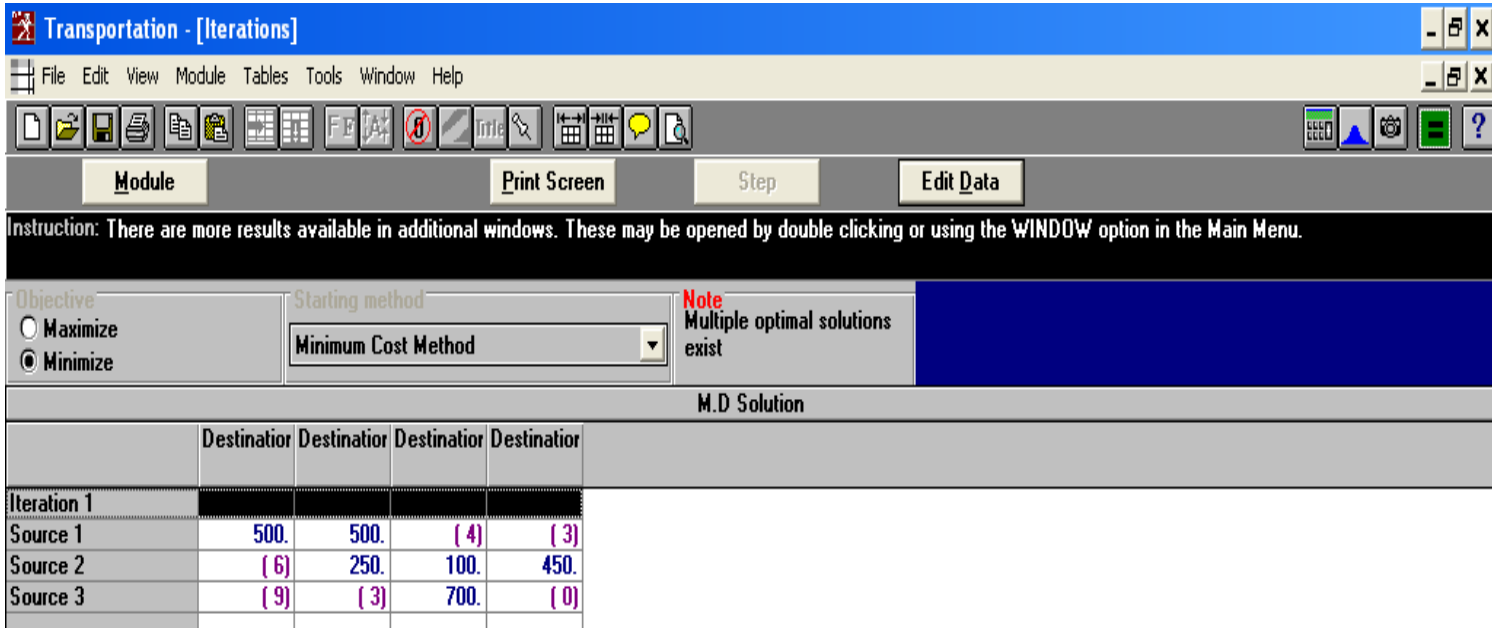

Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Northwest Corner Method
Note
Multiple optimal solutions exist
Shipping list
M.D Solution
From To Shipment Cost per unit Shipment cost
Source 1 Destination1 500. 3. 1,500.
Source 1 Destination2 500. 4. 2,000.
Source 2 Destination2 250. 5. 1,250.
Source 2 Destination3 550. 3. 1,650.
Source 3 Destination3 250. 2. 500.
Source 3 Destination4 450. 8. 3,600.

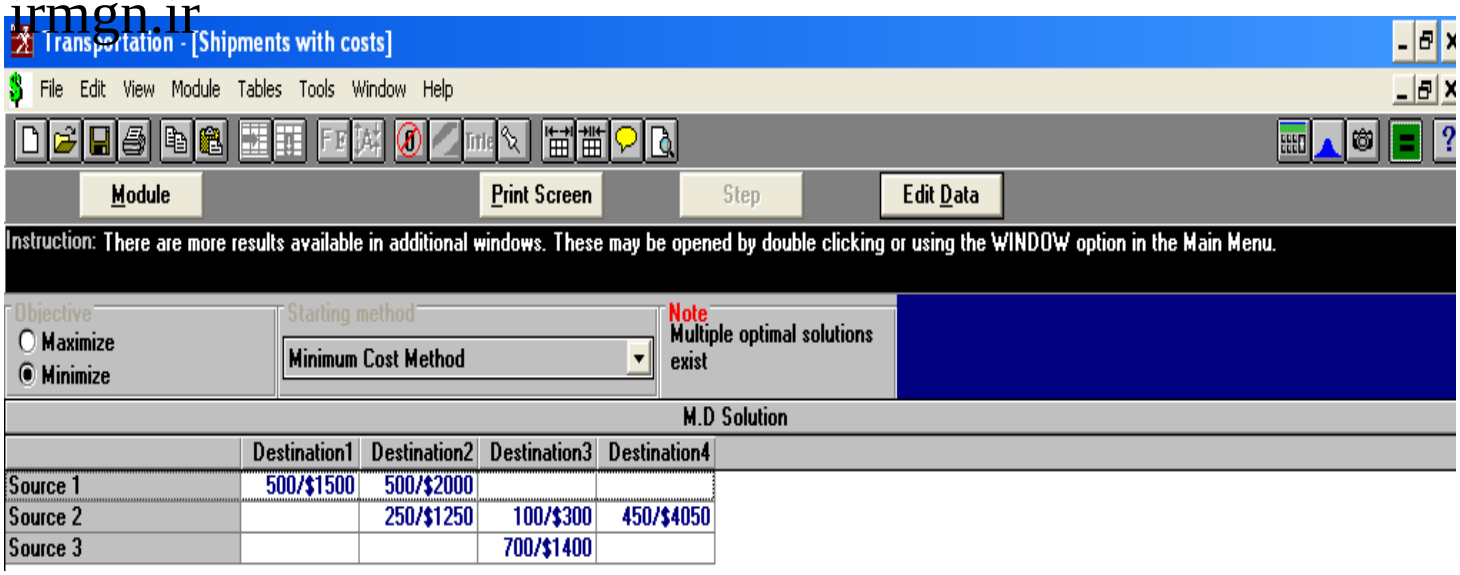
روش حداقل هزینه



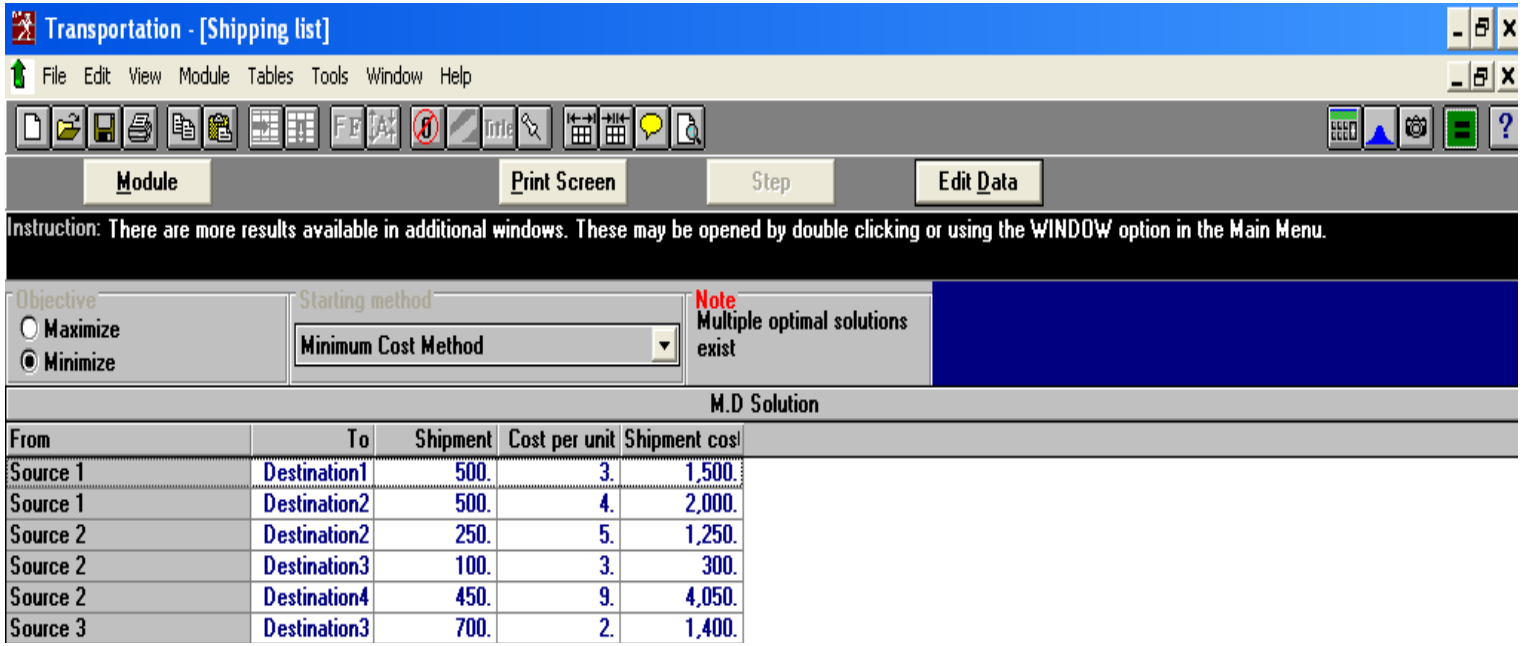



Transportation - [Final Solution Table]
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Minimum Cost Method
Note
Multiple optimal solutions exist
M.D Solution
Destination1 Destination2 Destination3 Destination4
Source 1 500. 500. (4) (3)
Source 2 (6) 250. 100. 450.
Source 3 (9) (3) 700. (0)


Transportation - [Iterations]
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Minimum Cost Method
Note
Multiple optimal solutions exist
M.D Solution
Destinatior Destinatior Destinatior Destinatior
Iteration 1
Source 1 500. 500. (4) (3)
Source 2 (6) 250. 100. 450.
Source 3 (9) (3) 700. (0)

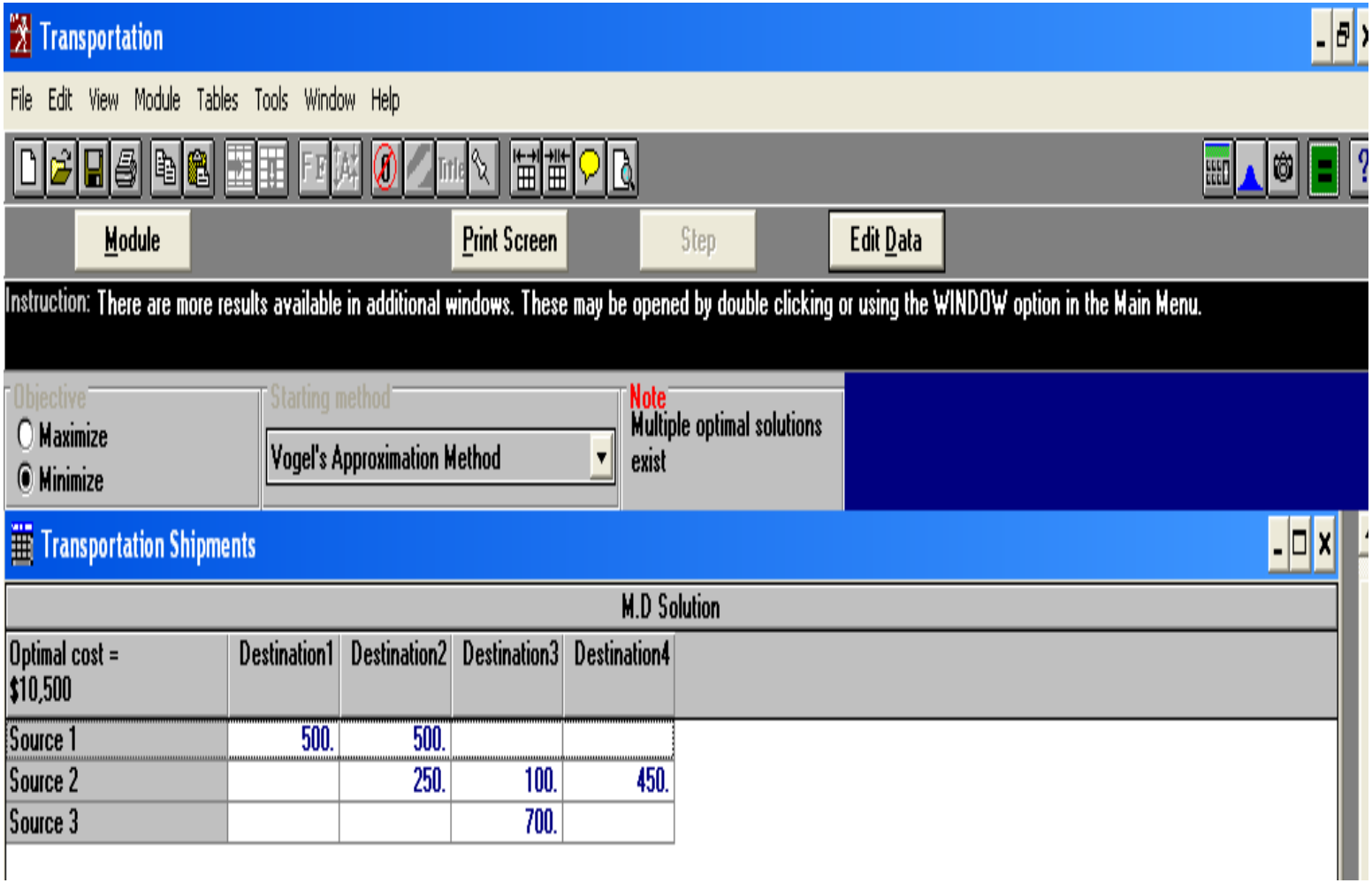


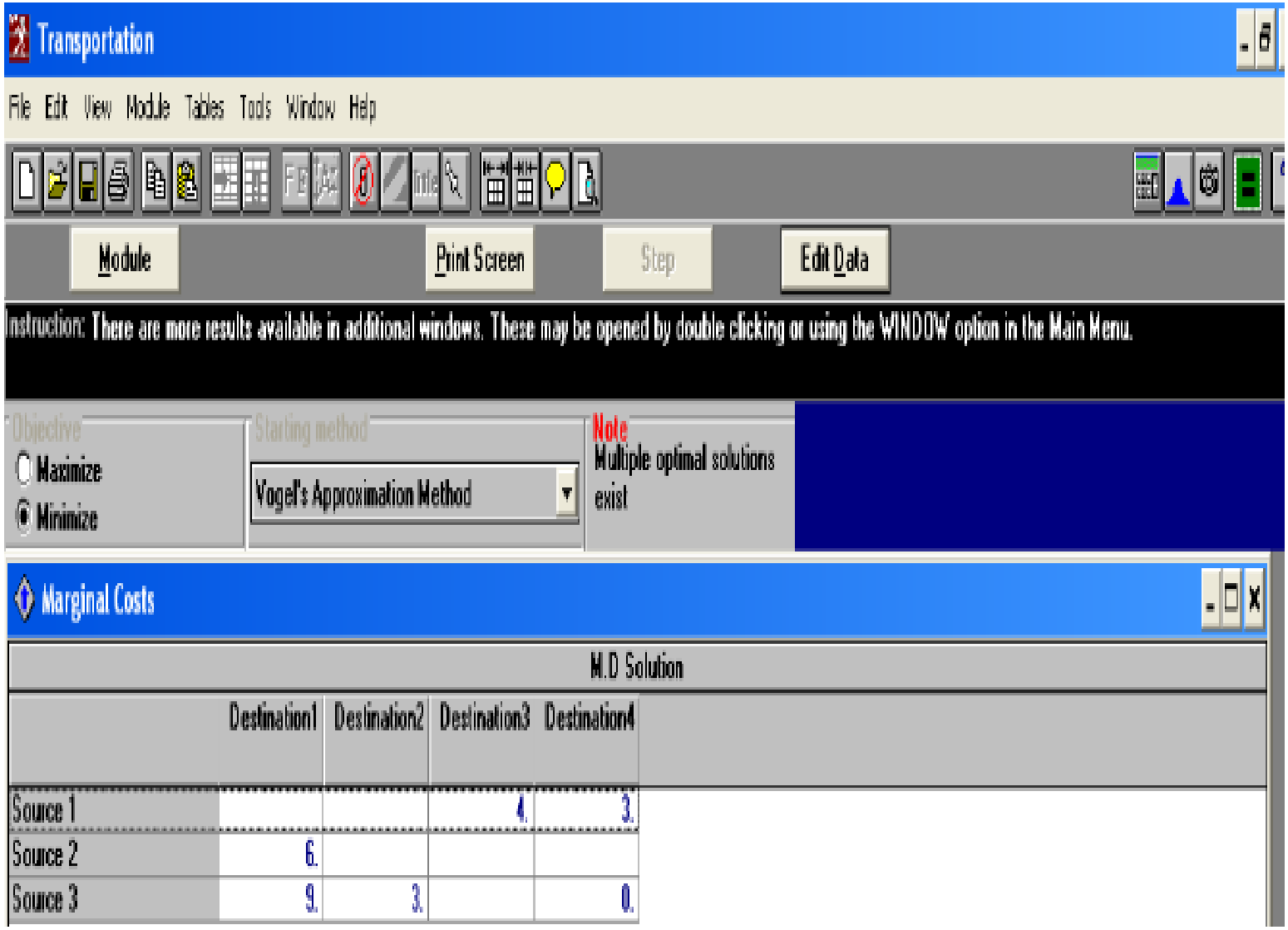
	Destination1	Destination2	Destination3	Destination4
Source 1	500/$1500	500/$2000		
Source 2		250/$1250	100/$300	450/$4050
Source 3			700/$1400	

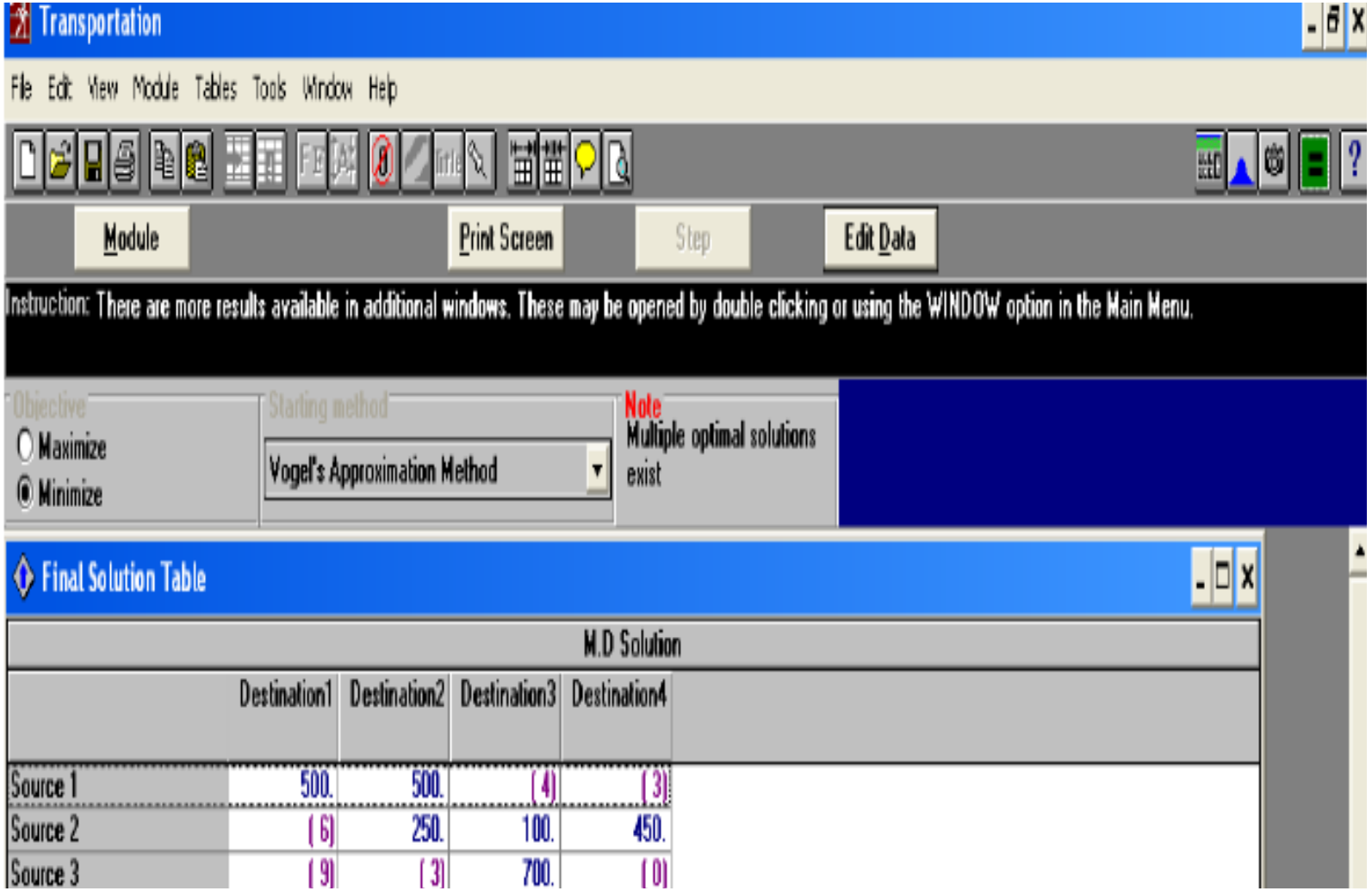


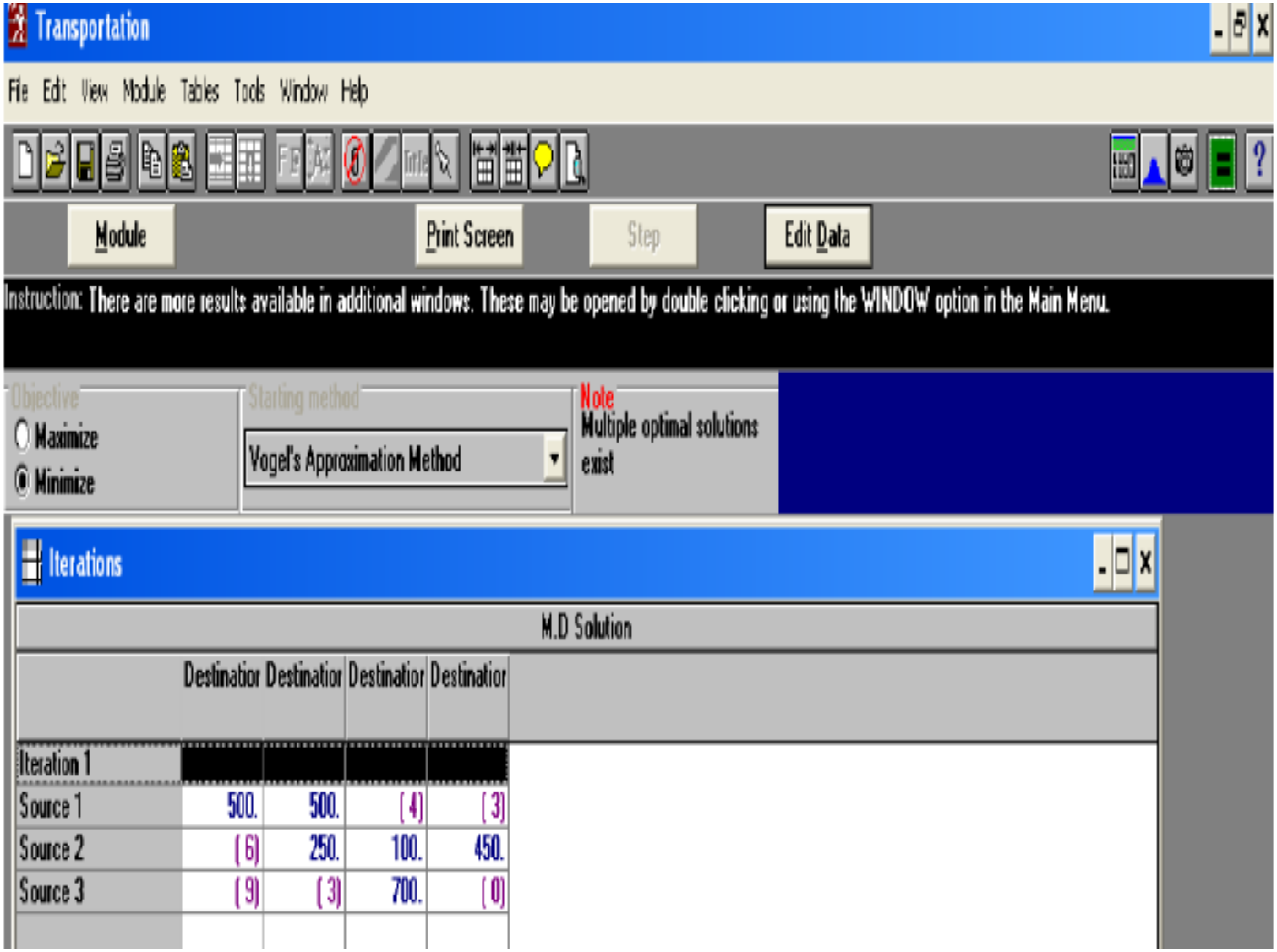
From	To	Shipment	Cost per unit	Shipment cost
Source 1	Destination1	500.	3.	1,500.
Source 1	Destination2	500.	4.	2,000.
Source 2	Destination2	250.	5.	1,250.
Source 2	Destination3	100.	3.	300.
Source 2	Destination4	450.	9.	4,050.
Source 3	Destination3	700.	2.	1,400.

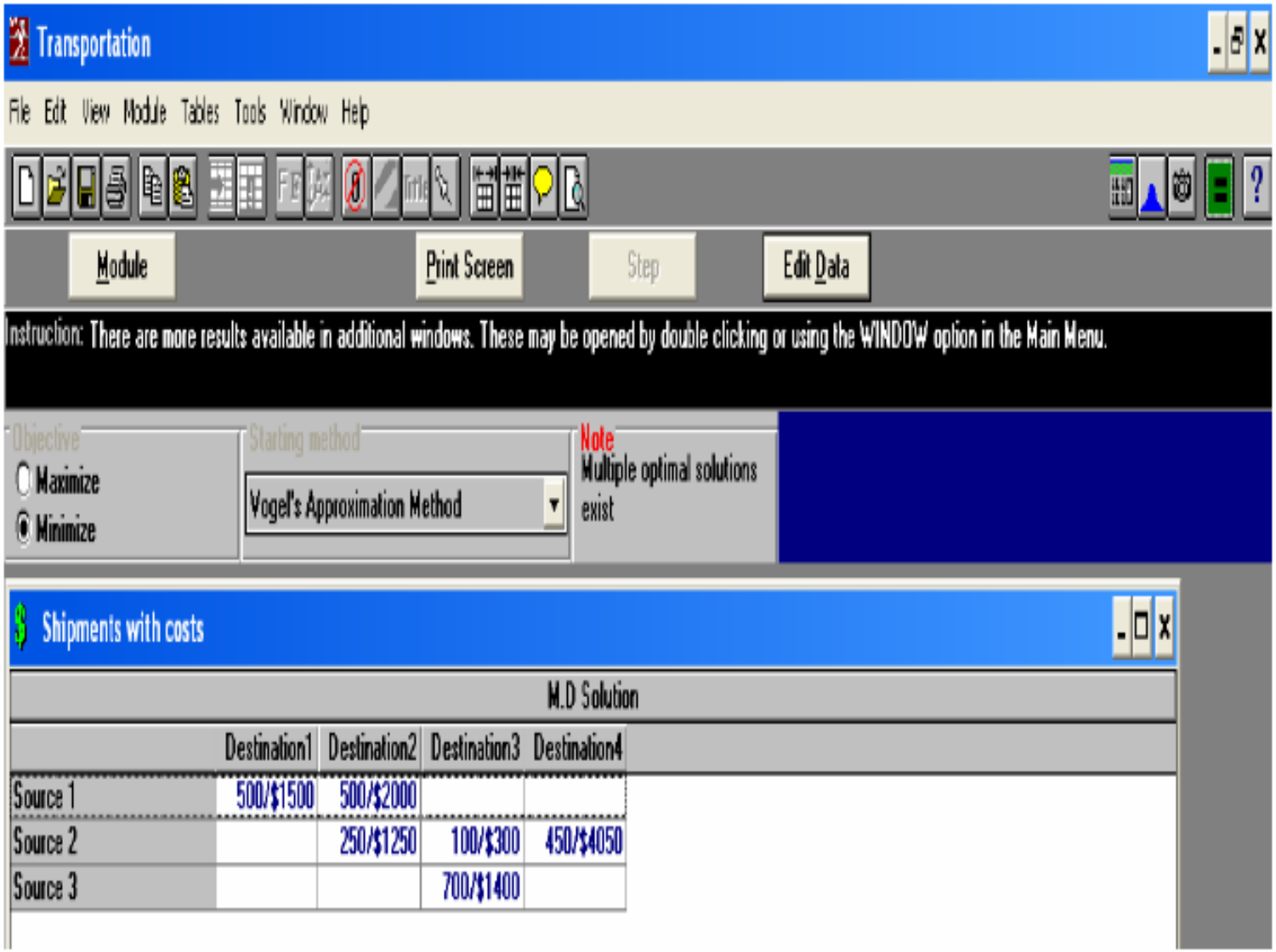
روش وگل

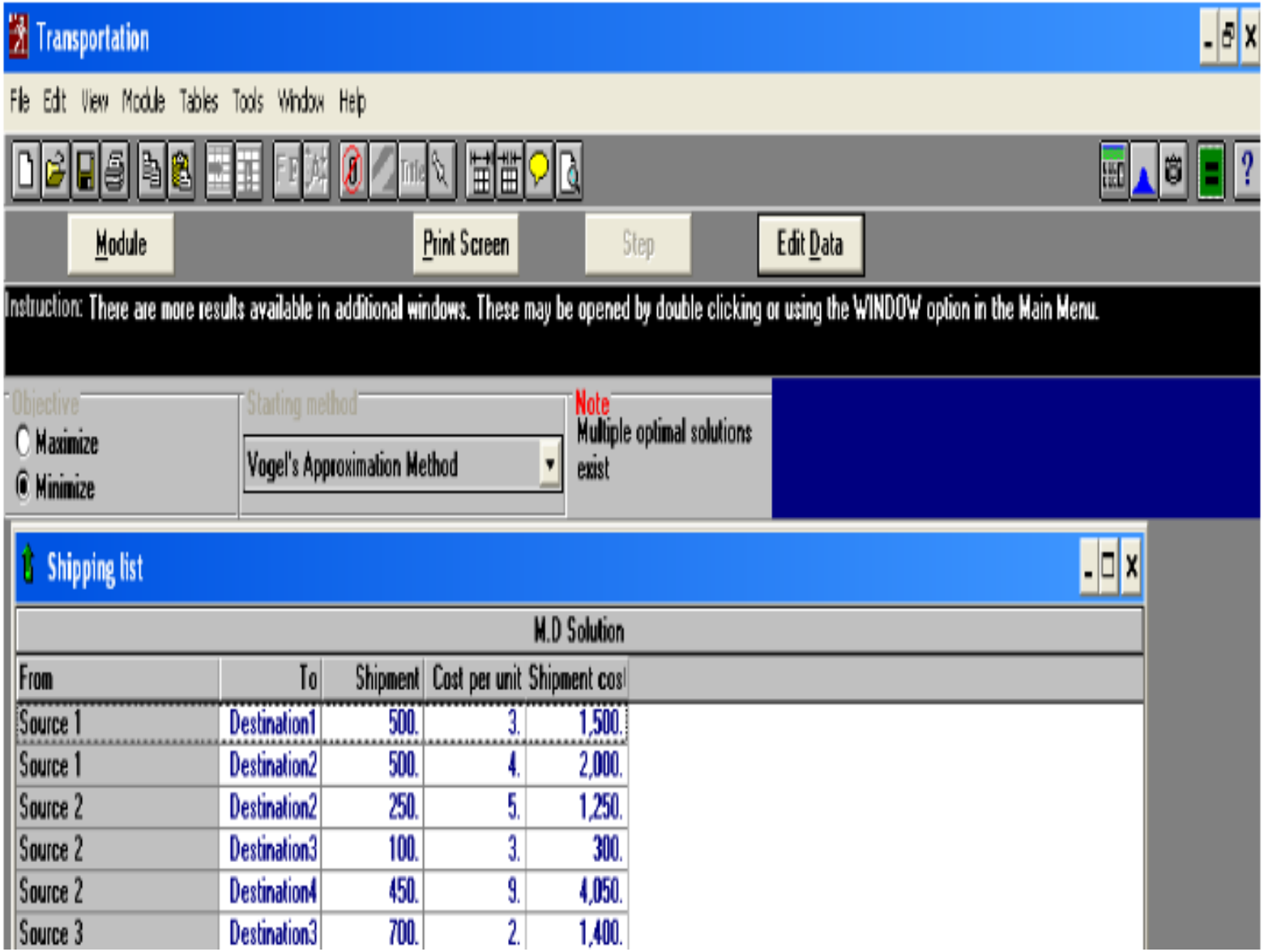



Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Vogel's Approximation Method
Note
Multiple optimal solutions exist
Marginal Costs
M.D Solution
Destination1 Destination2 Destination3 Destination4
Source 1 4. 3.
Source 2 6.
Source 3 9. 3. 0.

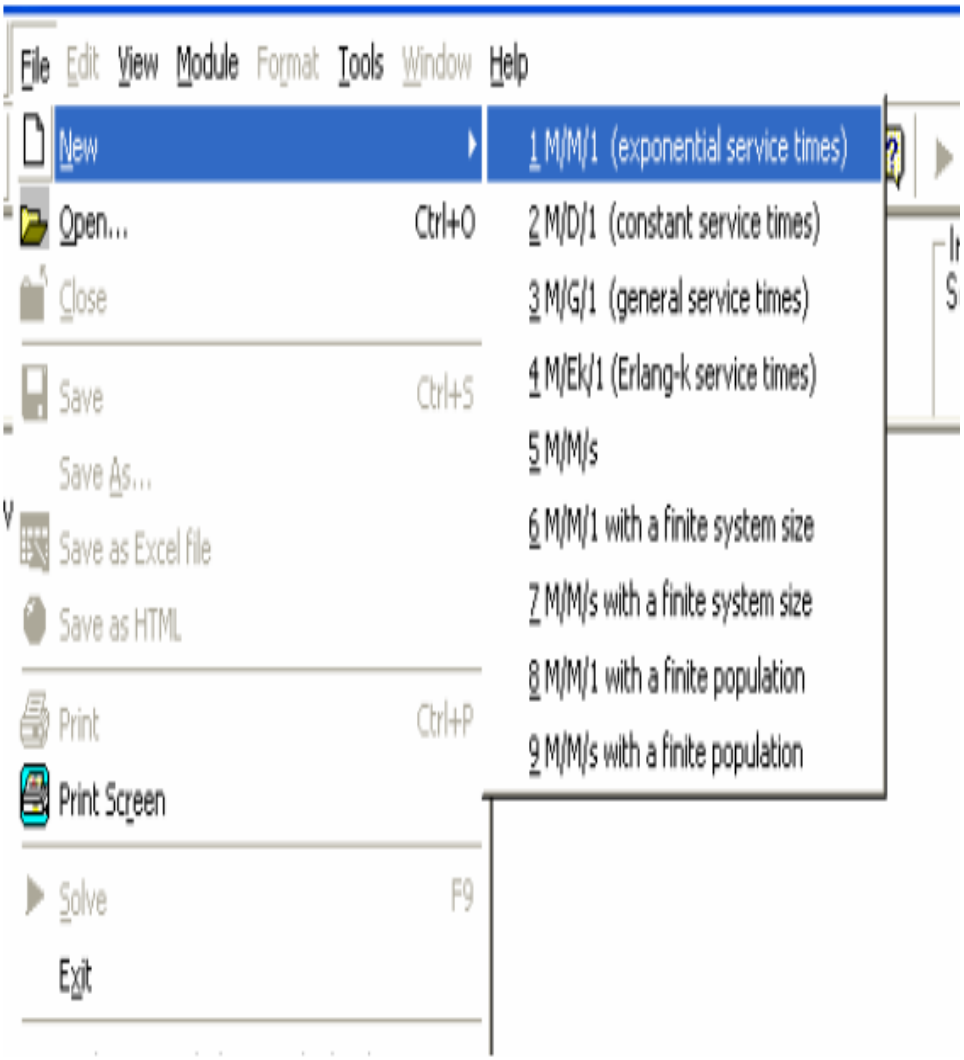

Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Vogel's Approximation Method
Note
Multiple optimal solutions exist
Final Solution Table
M.D Solution
Destination1
Destination2
Destination3
Destination4
Source 1
500.
500.
(4)
(3)
Source 2
(6)
250.
100.
450.
Source 3
(9)
(3)
700.
(0)


Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Vogel's Approximation Method
Note
Multiple optimal solutions exist
Iterations
M.D Solution
Destinatior Destinatior Destinatior Destinatior
Iteration 1
Source 1 500. 500. (4) (3)
Source 2 (6) 250. 100. 450.
Source 3 (9) (3) 700. (0)


Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Vogel's Approximation Method
Note
Multiple optimal solutions exist
Shipments with costs
M.D Solution
Destination1 Destination2 Destination3 Destination4
Source 1 500/$1500 500/$2000
Source 2 250/$1250 100/$300 450/$4050
Source 3 700/$1400


Transportation
File Edit View Module Tables Tools Window Help
Module
Print Screen
Step
Edit Data
Instruction: There are more results available in additional windows. These may be opened by double clicking or using the WINDOW option in the Main Menu.
Objective
Maximize
Minimize
Starting method
Vogel's Approximation Method
Note
Multiple optimal solutions exist
Shipping list
M.D Solution
From | To | Shipment | Cost per unit | Shipment cost
Source 1 | Destination1 | 500. | 3. | 1,500.
Source 1 | Destination2 | 500. | 4. | 2,000.
Source 2 | Destination2 | 250. | 5. | 1,250.
Source 2 | Destination3 | 100. | 3. | 300.
Source 2 | Destination4 | 450. | 9. | 4,050.
Source 3 | Destination3 | 700. | 2. | 1,400.

12-1)صف (*Waiting lines*)



1-توزیع ورودی پوآسون /توزیع زمان سرویس نمایی/یک سرویس دهنده

2- 1-توزیع ورودی پوآسون /توزیع زمان سرویس ثابت/یک سرویس دهنده

3- توزیع ورودی پوآسون /توزیع زمان سرویس کلی/یک سرویس دهنده

4- توزیع ورودی پوآسون /توزیع زمان سرویس ارلانگ/یک سرویس دهنده

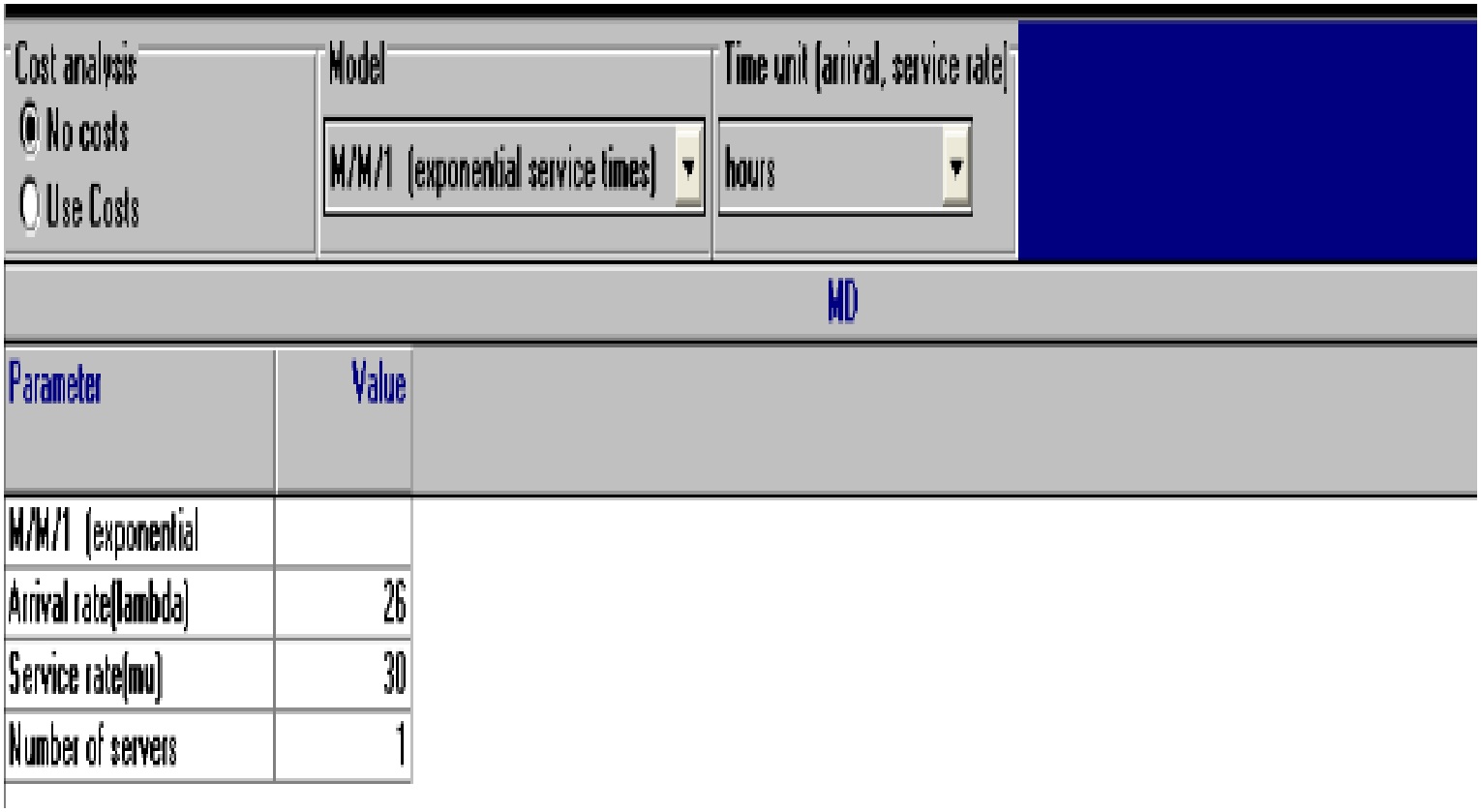
5- توزیع ورودی پوآسون /توزیع زمان سرویس نمایی/یک یا بیشتر ازیک سرویس دهنده

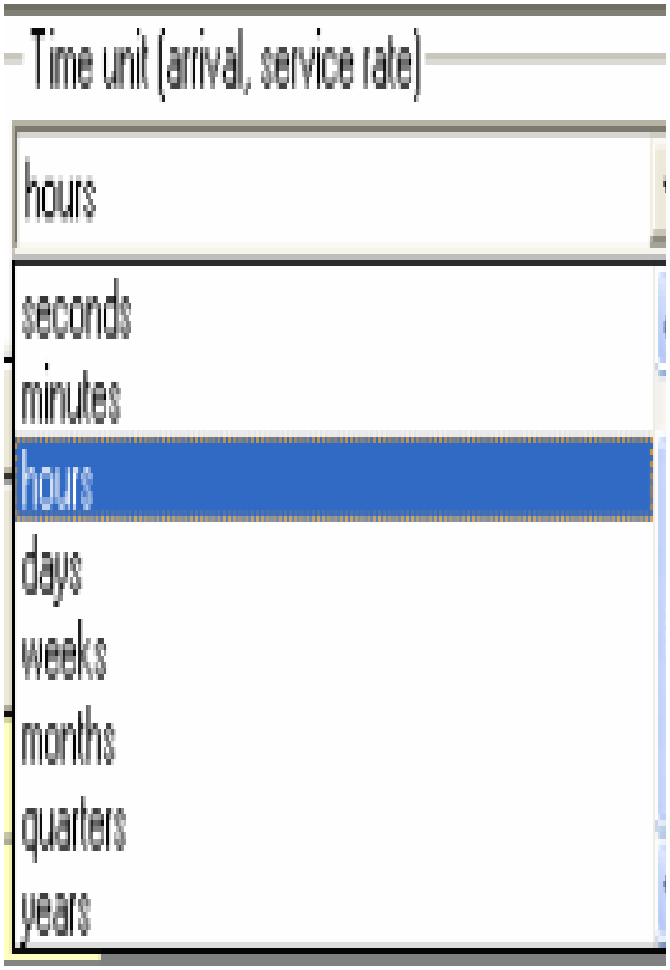
6-اندازه صف محدود یا منتاهی (سیستم متناهی)

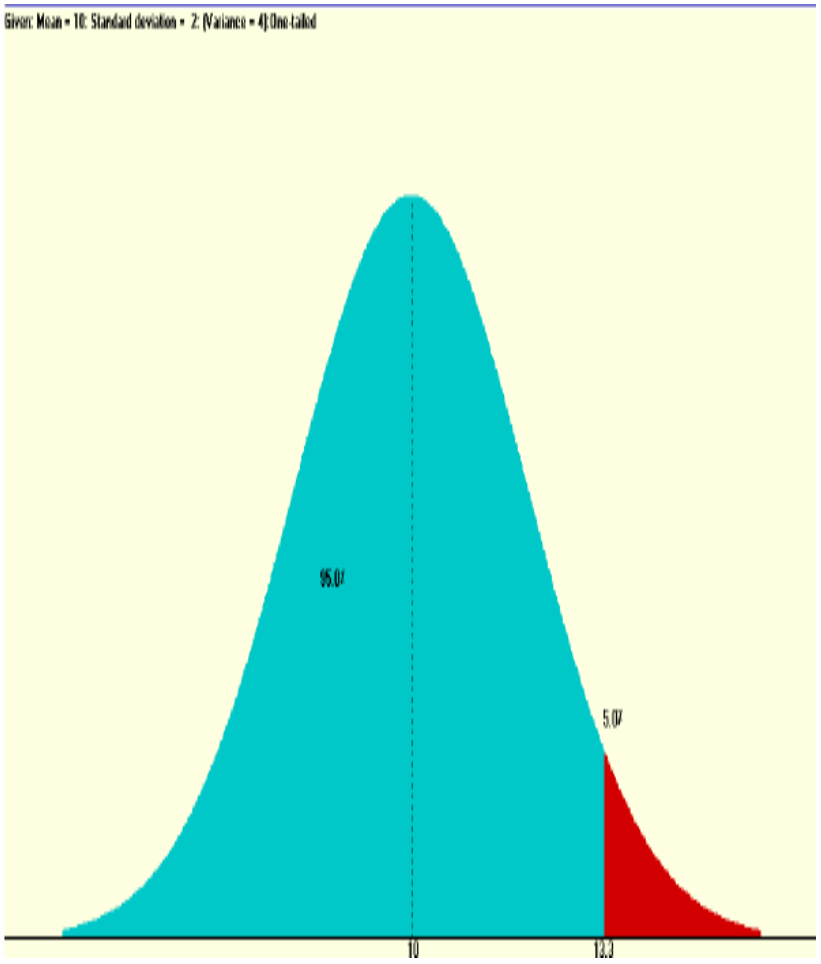
7-اندازه صف محدود یا منتاهی (سیستم متناهی)

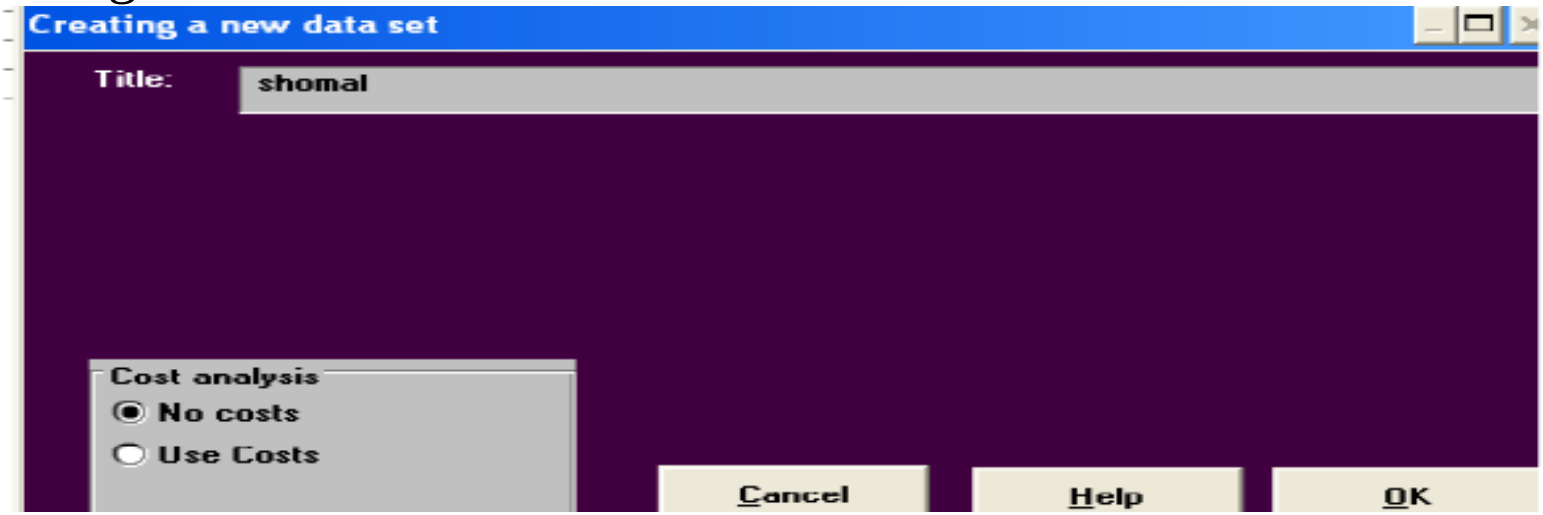
8-مدل1 با جمعیت متناهی

9-مدل 5 با جمعیت متناهی




Time unit (arrival, service rate)
hours
seconds
minutes
hours
days
weeks
months
quarters
years


Given: Mean = 10; Standard deviation = 2; (Variance = 4) One-tailed
95.0%
5.0%
10
12.3



Waiting Lines Results

sample solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	5.6333		
Service rate(mu)	30.	Average number in the system(Ls)	6.5		
Number of servers	1.	Average time in the queue(Wq)	0.2167	13.	780.
		Average time in the system(Ws)	0.25	15.	900.

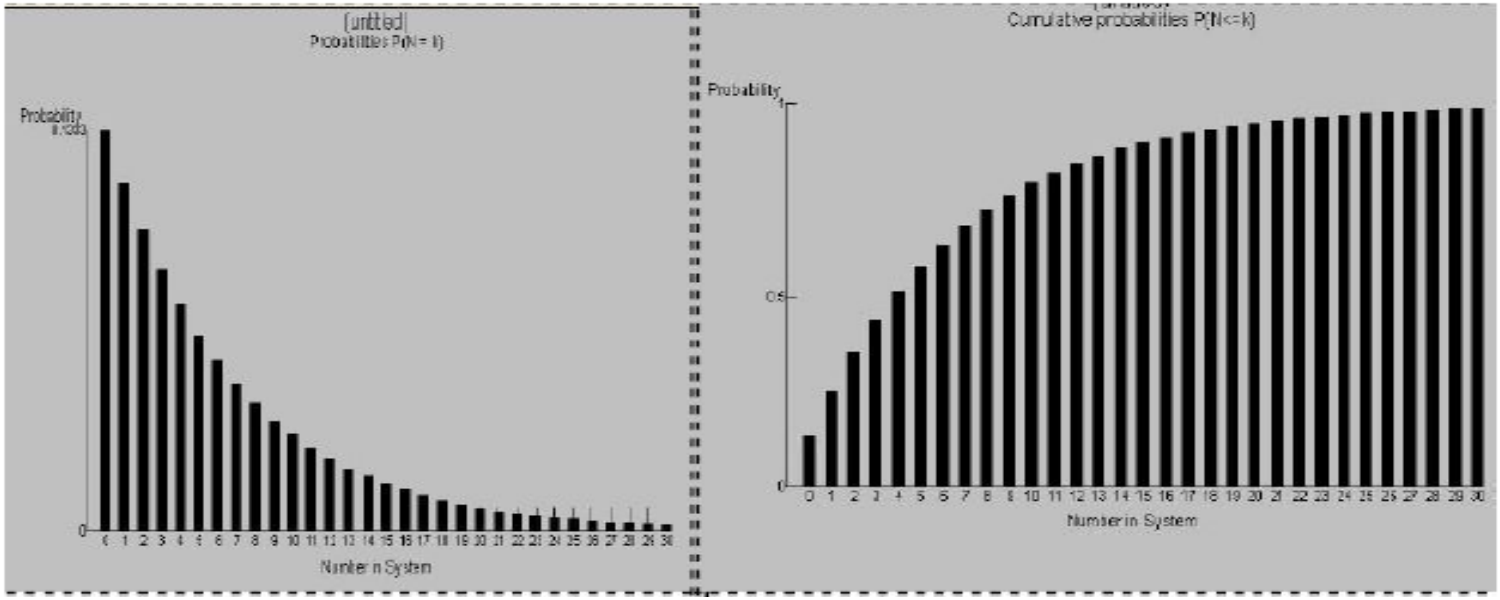
1. متوسط درصدی از زمان که هرسرویس دهنده مشغول به کار است
2. متوسط تعداد در صف
3. متوسط تعداد درسیستم
4. متوسط زمان انتظار در سیستم
5. متوسط زمان انتظار در صف

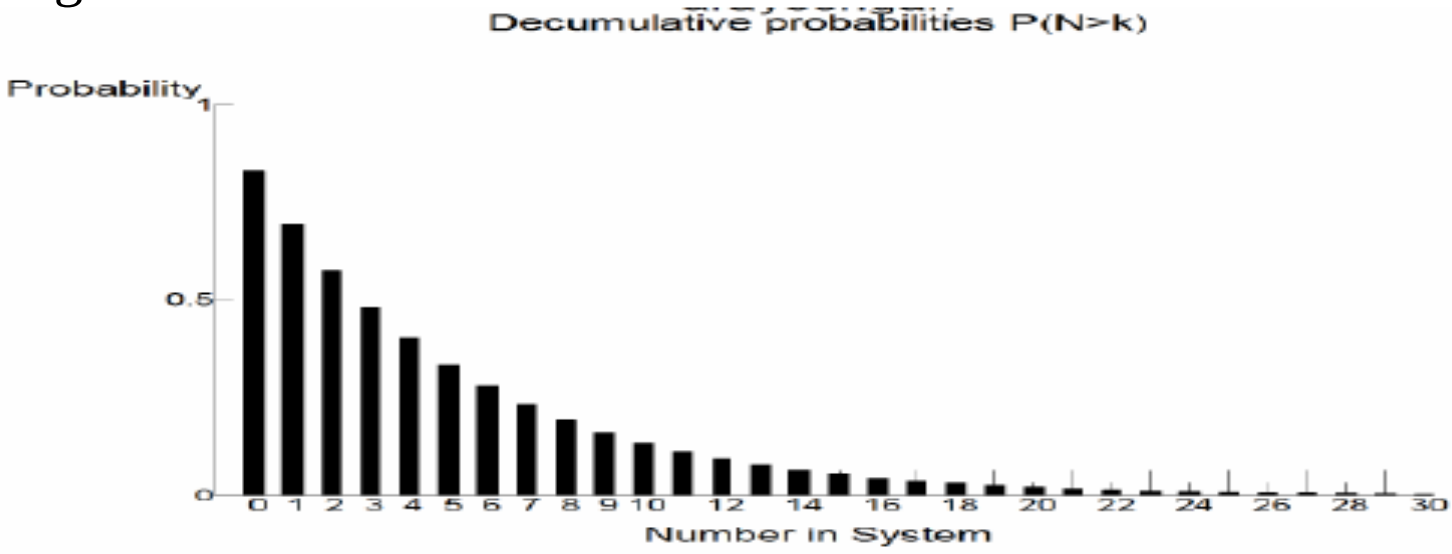
Table of Probabilities

sample solution

k	Prob (num in sys = k)	Prob (num in sys <= k)	Prob (num in sys >k)
0	0.1333	0.1333	0.8667
1	0.1156	0.2489	0.7511
2	0.1001	0.349	0.651
3	0.0868	0.4358	0.5642
4	0.0752	0.5111	0.4889
5	0.0652	0.5762	0.4238
6	0.0565	0.6327	0.3673
7	0.049	0.6817	0.3183
8	0.0424	0.7242	0.2758
9	0.0368	0.7609	0.2391
10	0.0319	0.7928	0.2072
11	0.0276	0.8204	0.1796
12	0.0239	0.8444	0.1556
13	0.0207	0.8651	0.1349

نمودار احتمال تعداد در سیستم و نمودار تجمعی آن به صورت زیر است:




Decumulative probabilities P(N>k)
Probability
1
0.5
0
0 1 2 3 4 5 6 7 8 9 10 12 14 16 18 20 22 24 26 28 30
Number in System

M/D/1

Waiting Lines Results

M/D/1 Example Solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	2.8167		
Service rate(mu)	30.	Average number in the system(Ls)	3.6833		
Number of servers	1.	Average time in the queue(Wq)	0.1083	6.5	390.
		Average time in the system(Ws)	0.1417	8.5	510.

M/G/1

Waiting Lines Results

M/G/1 Example Solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	9.1542		
Service rate(mu)	30.	Average number in the system(Ls)	10.0208		
Number of servers	1.	Average time in the queue(Wq)	0.3521	21.125	1,267.5
standard deviation	0.05	Average time in the system(Ws)	0.3854	23.125	1,387.5

Waiting Lines Results

Exponential Service Times Expressed as an M/G/1 Queue Solution

Parameter	Value	Parameter	Value	Value *60	Value *60 *60
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	5.6333		
Service rate(mu)	30.	Average number in the system(Ls)	6.5		
Number of servers	1.	Average time in the queue(Wq)	0.2167	13.	779.9993
standard deviation	0.0333	Average time in the system(Ws)	0.25	15.	899.9993

Waiting Lines Results

Constant Service Times Expressed as an M/G/1 Queue Solution

Parameter	Value	Parameter	Value	Value * 60	Value * 60 * 60
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	2.8167		
Service rate(mu)	30.	Average number in the system(Ls)	3.6833		
Number of servers	1.	Average time in the queue(Wq)	0.1083	6.5	390.
standard deviation	0.	Average time in the system(Ws)	0.1417	8.5	510.

M/EK/1

Waiting Lines Results

Erlang service times solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	3.7556		
Service rate(mu)	30.	Average number in the system(Ls)	4.6222		
Number of servers	1.	Average time in the queue(Wq)	0.1444	8.6667	520.
k for Erlang-k	3.	Average time in the system(Ws)	0.1778	10.6667	640.

Waiting Lines Results

bank solution

Parameter	Value	Parameter	Value	Minutes	Seconds
M/Ek/1 (Erlang-k service times)		Average server utilization	0.6667		
Arrival rate(lambda)	4.	Average number in the queue(Lq)	0.8333		
Service rate(mu)	6.	Average number in the system(Ls)	1.5		
Number of servers	1.	Average time in the queue(Wq)	0.2083	12.5	750.
k for Erlang-k	4.	Average time in the system(Ws)	0.375	22.5	1,350.

M/M/S

Waiting Lines Results

Multiple servers solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.4333		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	0.2004		
Service rate(mu)	30.	Average number in the system(Ls)	1.067		
Number of servers	2.	Average time in the queue(Wq)	0.0077	0.4624	27.7428
		Average time in the system(Ws)	0.041	2.4624	147.7428

M/M/S با هزینه

Waiting Lines Results

sample solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.8667		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	5.6333		
Service rate(mu)	30.	Average number in the system(Ls)	6.5		
Number of servers	1.	Average time in the queue(Wq)	0.2167	13.	780.0001
Server cost $/time	4.	Average time in the system(Ws)	0.25	15.	900.0001
Waiting cost $/time	2.	Cost (Labor + #waiting*wait cost)	15.2667		
		Cost (Labor + #in system*wait cost)	17.		

M/M/S با اندازه صف محدود

Waiting Lines Results

Finite system size model solution

Parameter	Value	Parameter	Value	Minutes	Seconds
		Average server utilization	0.618		
Arrival rate(lambda)	26.	Average number in the queue(Lq)	0.2869		
Service rate(mu)	30.	Average number in the system(Ls)	0.9049		
Number of servers	1.	Average time in the queue(Wq)	0.0155	0.9286	55.7143
maximum system size	2.	Average time in the system(Ws)	0.0488	2.9286	175.7143
		Effective Arrival Rate	18.5399		
		Probability that system is full	0.2869		

Table of Probabilities

Finite system size model solution

k	Prob (num in sys = k)	Prob (num in sys <= k)	Prob (num in sys >k)
0	0.382	0.382	0.618
1	0.3311	0.7131	0.2869
2	0.2869	1.	0.