SPRING 2014

QANT 405 – MANAGEMENT SCIENCE

A3 - Take Home Optimization Quiz 1

Student Name: David **ID:** 762406

S.No	Score	Poor	Fair	Good	Very Good	Excellent
1	Ability to model and solve the problem presented					✓
2	Ability to utilize, correctly, relevant field specific software					✓
3	Quality and results of a sensitivity analysis, including what-if scenarios together with management implications for practice				✓	

M202 - Use technology to model and solve an operational problem

M203 - Utilize field specific software

M401 - Contribute an analysis in support of, or develop, a business plan

NEW YORK INSTITUTE OF TECHNOLOGY

QANT 405 – MANAGEMENT SCIENCE

HOME OPTIMIZATION QUIZ 1

Student Name: David Palisoul **ID: 0762406**

Max POINTS: 25 **Date of submission: 27.02.14**

10+10+4

Q1: A company located in New York involves in production of house-holding devices. It has four plants located in various places, which produce new kinds of doors and windows in addition with other products. The following table shows the available hours per week of production facilities in each plant and production time needed for producing each door and window at each plant:

Plant	Production time used for each unit produced		Available hours per week
	Doors	Windows	
P1	1	0	4
P2	0	2	12
P3	3	2	18
P4	1	6	25

Accounting department of this company estimated that it will gain $300 profit for a door and $500 profit for a window. It is assumed that all the amounts produced are consumed in the market.

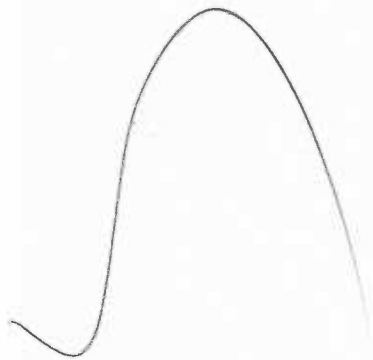
a. Construct a mathematical model for this problem
   - **a.** Maximization
   - **b.** 2 Variables
   - **c.** M=2
     - **i.** The # of doors to be produced
     - **ii.** The # of Windows to be produced
   - **d.** Z = $300X1 + $500X2
   - **e.** Constraints = 4
     - **i.** P1 = 1X1 + 0X2 =< 4
     - **ii.** P2 = 0X1 + 2X2 =< 12
     - **iii.** P3 = 3X1 + 2X2 =< 18
     - **iv.** P4 = 1X1 + 6X2 =< 25

f. Non Negative
    i. X1 >= 0
    ii. X2 >= 0

b. Solve this problem with the help of MS Excel Solver Add-In.
c. Generate and explain the results of sensitivity report, and also provide managerial implications for practice.
    a. Doors
        i. LL: 300 – 216.667 = 83.33
        ii. UL: 300 + 450 = 750
        iii. Range: 83.33 to 750
    b. Windows
        i. LL: 500 – 300 = 200
        ii. UL: 500 + 1300 = 1800
        iii. Range: 200 to 1800
    c. P1
        i. LL: 4 – 0.375 = 3.625
        ii. UL: 4 + 1E+30
        iii. Range: 3.625 to (4 + 1E+30)
    d. P2
        i. LL: 12 – 4.875 = 7.125
        ii. UL: 12 + 1E+30
        iii. Range: 7.125 to (4 + 1E+30)
    e. P3
        i. LL: 18 – 9.667 = 8.333
        ii. UL: 18 + 1 = 19
        iii. Range: 8.333 to 19
    f. P4
        i. LL: 25 – 3 = 22
        ii. UL: 25 + 13 = 38
        iii. Range: 22 to 38
    g. These ranges are showing the allowable changes in production before the unit of production changes in the solver formula. If you change one of the values to a number outside the range for that number, then the production value will change. If it is changed within the range, then nothing will change.

implications? (-1)

Plant	Production time used for each unit produced		Hours Used		Available hours per week
	Doors	Windows			
P1	1	0	3.625	=<	4
P2	0	2	7.125	=<	12
P3	3	2	18	=<	18
P4	1	6	25	=<	25
	Doors	Windows			
Unit Profit	300	500			
	Doors	Windows			
Units Produced	3.625	3.5625		Total Profit	2868.75



Plant	Production time used for each unit produced		Hours Used		Available hours per week	
	Doors	Windows				
P1	1	0	=B3*B$11+C3*C$11	=<	4	
P2	0	2	=B4*B$11+C4*C$11	=<	12	
P3	3	2	=B5*B$11+C5*C$11	=<	18	
P4	1	6	=B6*B$11+C6*C$11	=<	25	
	Doors	Windows				
Unit Profit	300	500				
	Doors	Windows				
Units Produced	3.625	3.5625			Total Profit	=SUMPRODUCT(B9:C9,B11

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QANT 405 – MANAGEMENT SCIENCE

A3 - Take Home Optimization Quiz 2

Student Name: Junfei **ID:** 897516

S.No	Score	Poor	Fair	Good	Very Good	Excellent
1	Ability to model and solve the problem presented					✓
2	Ability to utilize, correctly, relevant field specific software					✓
3	Quality and results of a sensitivity analysis, including what-if scenarios together with management implications for practice				✓	

NEW YORK INSTITUTE OF TECHNOLOGY MANHATTAN

QANT 405 - MANAGEMENT SCIENCE

HOME QUIZ 2

Student Name: Zheng Junfei **ID:** 897516

Max Points: 25 10+10+5 **Date of submission: 06.03.14**

One of the main products of P&T Company is canned peas. The peas are prepared at two canneries (near Bellingham, Washington; and Albert Lea, Minnesota) and are then shipped by truck to four distributing warehouses in Sacremento, California; Salt Lake City, Utah; Rapid City, South Dakota; and Albuquerque, New Mexico. Because shipping costs are a major expense, management has begun a study to reduce them. For the upcoming season, an estimate has been made of what the output will be from each cannery, and how much each warehouse will require to satisfy its customers. The shipping costs from each cannery to each warehouse have also been determined and summarized below:

	Shipping cost per truckload ($)				Output
	Warehouse 1	Warehouse 2	Warehouse 3	Warehouse 4	
Cannery 1	464	513	654	867	200
Cannery 2	352	416	690	791	475
Order size	100	275	100	200	

a. Draw a network diagram and construct a mathematical model for this problem (10 Points)

Step 1 Minimum

Step 2 N=8

Step 3 X11 the number of pears are delivered from Cannery 1 to Warehouse 1.

X12 the number of pears are delivered from Cannery 1 to Warehouse 2.

X13 the number of pears are delivered from Cannery 1 to Warehouse 3.

	Shipping cost per truckload ($)				Output
	Warehouse 1	Warehouse 2	Warehouse 3	Warehouse 4	
Cannery 1	464	513	654	867	200
Cannery 2	352	416	690	791	475
Order size	100	275	100	200	

	NUMBERS				Output	Constraint
	Warehouse 1	Warehouse 2	Warehouse 3	Warehouse 4		
Cannery 1	0	0	100	100	200	200
Cannery 2	100	275	0	100	475	475
Order size	100	275	100	200		
constraint	100	275	100	200		

total shipping cc
380800

The range on the values of profit of pears from Cannery 1 Warehouse 2 such that the current optimal product mix remains optimal.

Lower limit = 513-21 = 492

Upper limit= 513+ (1E+30) = E

Range (492, E)

The range on the values of profit of pears from Cannery 1 Warehouse 3 such that the current optimal product mix remains optimal.

Lower limit = 654-(1E+30) = -E

Upper limit= 654+ 112 = 766

Range (-E,766)

The range on the values of profit of pears from Cannery 1 Warehouse 4 such that the current optimal product mix remains optimal.

Lower limit = 867-112 = 755

Upper limit= 867+21= 888

Range (755,888)

The range on the values of profit of pears from Cannery 2 Warehouse 1such that the current optimal product mix remains optimal.

Lower limit = 352- (E+30)= -E

Upper limit= 352+36= 388

Range (-E,388)

The other three analysis are similar to up.

How much extra profit this firm will get when it increases painting available per pear at from cannery 1?

Lower limit= 100-100=0

Upper limit=100+0= 100

Range (0, 100)

428$ extra profit/ per is delivery from (0, 100) at cannery 1.