MDSC-103(P)-Assignment

Registration NUMBER: 22229

Question B)

Outdoors, Inc has, as one of its product lines, lawn furniture. They currently have three items in that line: a lawn chair, a standard bench, and a table. These products are produced in a two-step manufacturing process involving the tube-bending department and the welding department. The time required by each item in each department is as follows:

	Product			Present Capacity
	Lawn Chair	Bench	Table	
Tube Bending(hrs)	1.2	1.7	1.2	1000 hrs.
Welding(hrs)	0.8	0	2.3	1200 hrs.
Tubing(lbs.)	2	3	4.5	2000 lbs.

1. Formulate LP model for this problem?

max	3x1+3x2+5x3
subject to	
	1.2x1+1.7x2+1.2x3<=1000(M1)
	0.8x1 + 0x2 + 2.3x3 <=1200(M2)
	2x1 + 3x2 + 4.5x3 <=2000(M3)
	x1 , x2 ,x3 >=1

2. Solve the problem by SOLVER?

		x1(lawn chairs)	x2(bench)	x3(table)			Optimum	
max	z	3	3	5			2766.667	RHS
		700	0	133.3333				
M1(Tube Bending)		1.2	1.7	1.2		1000	<=	1000
M2(Welding)		0.8	0	2.3		866.6667	<=	1200
M3(Tubing)		2	3	4.5		2000	<=	2000

3. What is the optimal production mix? What contribution can the firm anticipate by producing this mix?

The optimal production mix is 700 Lawn Chairs, 0 Benches 133 Tables and Profit that can be made is 2766.667.

4. What is the value of one unit more of tube-bending time? Of welding time? Of metal tubing?

1 more unit of Tube-Bending Time:

		x1(lawn c	x2(bench)	x3(table)			Optimum	
Max	z	3	3	5			2236.364	RHS
	soln	18.18182	0	436.3636				
M1(Tube Bending)		2.2	2.7	2.2		1000	<=	1000
M2(Welding)		0.8	0	2.3		1018.182	<=	1200
M3(Tubing)		2	3	4.5		2000	<=	2000

1 more unit of Welding Time:

		x1(lawn c	x2(bench)	x3(table)			Optimum	
Max	z	3	3	5			2347.475	RHS
	soln	290.9091	303.0303	113.1313				
M1(Tube Bending)		1.2	1.7	1.2		1000	<=	1000
M2(Welding)		1.8	1	3.3		1200	<=	1200
M3(Tubing)		2	3	4.5		2000	<=	2000

1 more unit of Tubing Time:

		x1(lawn ch	x2(bench)	x3(table)		Optimum	
Max	z	3	3	5		2000	RHS
	soln	666.6667	0	0			
M1(Tube Bending)		1.2	1.7	1.2	800	<=	1000
M2(Welding)		0.8	0	2.3	533.3333	<=	1200
M3(Tubing)		3	4	5.5	2000	<=	2000

5. A local distributor has offered to sell Outdoors, Inc some additional metal tubing for $ 0.60/lb. Should Outdoors buy it? If yes, how much would the firm's contribution increase if they bought 500 lbs. and used it in an optimal fashion?

		x1(lawn chairs)	x2(bench)	x3(table)		Optimum	
Max	z	3	3	5		3166.667	RHS
	soln	500	0	333.3333			
M1(Tube Bending)		1.2	1.7	1.2	1000	<=	1000
M2(Welding)		0.8	0	2.3	1166.667	<=	1200
M3(Tubing)		2	3	4.5	2500	<=	2500

6. If Outdoors, Inc. feels that it must produce at least 100 benches to round out its product line, what effect will that have on its contribution?

		x1(lawn chairs)	x2(bench)	x3(table)		Optimum	
Max	z	3	3	5		3166.667	RHS
	soln	500	0	333.3333			
M1(Tube Bending)		1.2	1.7	1.2	1000	<=	1000
M2(Welding)		0.8	0	2.3	1166.667	<=	1200
M3(Tubing)		2	3	4.5	2500	<=	2500
M4		0	1	0	0	>=	100

7. The R&D department has been redesigning the bench to make it more profitable. The new design will require 1.1 hours of tube-bending time, 2.0 hours of welding time, and 2.0 lbs. of metal tubing. If it can sell one unit of this bench with a unit contributing of $3, what effect will it have on overall contribution?

		x1(lawn chairs)	x2(bench)	x3(table)		Optimum	
Max	z	3	3	5		2800	RHS
	soln	457.1428571	285.7143	114.2857			
M1(Tube Bending)		1.2	1.1	1.2	1000	<=	1000
M2(Welding)		0.8	2	2.3	1200	<=	1200
M3(Tubing)		2	2	4.5	2000	<=	2000

9.Outdoors, Inc. has a chance to sell some of its capacity in tube bending at cost + $1.50 per hour. If it sells 200 hours at that price, how will this affect contribution?

		x1(lawn chairs)	x2(bench)	x3(table)		Optimum	
Max	z	3	3	5		3000	RHS
	soln	1000	0	0			
M1(Tube Bending)		1.2	1.7	1.2	1200	<=	1200
M2(Welding)		0.8	0	2.3	800	<=	1200
M3(Tubing)		2	3	4.5	2000	<=	2000

10. If the contribution on chairs were to decrease to $2.50, what would be the optimal production mix and what contribution would this production plan give?

		x1(lawn c	x2(bench)	x3(table)		Optimum	
Max	z	3	3	5		2766.667	RHS
	soln	700	0	133.3333			
M1(Tube Bending)		1.2	1.7	1.2	1000	<=	1000
M2(Welding)		0.8	0	2.3	866.6667	<=	1200
M3(Tubing)		2	3	4.5	2000	<=	2000