Assignment 3: Sean Delahunty

Back Savers is a company that produces backpacks primarily for students. They are considering offering some combination of two different models—the Collegiate and the Mini. Both are made out of the same rip-resistant nylon fabric. Back Savers has a long-term contract with a supplier of the nylon and receives a 5000 square-foot shipment of the material each week. Each Collegiate requires 3 square feet while each Mini requires 2 square feet. The sales forecasts indicate that at most 1000 Collegiates and 1200 Minis can be sold per week. Each Collegiate requires 45 minutes of labor to produce and generates a unit profit of $32. Each Mini requires 40 minutes of labor and generates a unit profit of $24. Back Savers has 35 laborers that each provides 40 hours of labor per week. Management wishes to know what quantity of each type of backpack to produce per week. Solve this problem graphically.

	A	B	C	D	E	F	G	H	I
1									
2		Back Savers				Collegiate		Mini	
3					Variable:	C		M	
4		Total Employees:	35.00		Max Units Sold / Week:	1,000.00		1,200.00	
5		Hours worked per week:	40.00		Labor Units to Produce 1 unit:	45 m		40 m	
6		Total Hours Worked / Week:	1,400.00		Unit Profit:	32.00		24.00	
7					Total Fabric needed to produce 1 unit:	3 sq. ft		2 sq. ft	
8		Recieves 5,000 Sq.ft nylon / week							
9									
10		Questions:							
11									
12		A. Decision Variables:	C = number of Collegiate units made per week						
13			M = number of Mini units made per week						
14									
15		B. Objective Fuction:	The objective function is to calculate the quantity of backpacks for each different product to						
16			produce each week for maximum profit.						
17			$32C + $24M = Max Profit Value						
18									
19		C. Constraints:	A. total number of hours worked cannot exceed the number availble, which is 1,400 hours for each week.						
20			45 minutes converted to hours = (3/4) hours for C						
21			40 minutes converted to hours = (2/3) for M						
22			(3/4)C + (2/3)M <= 1,400 hours						
23									
24			B. total amount of nylon used cannon exceed the number availble which is 5,000 sq. ft for each week.						
25			3C + 2M <= 5,000 sq. ft						
26									
27			C. Do not exceed sales projections.						
28			C<= 1,000 units						
29			M<= 1,200 units						
30									
31		D. Full mathematical formulation for this LP problem							
32			Let	C = number of Collegiate units made per week					
33				M = number of Mini units made per week					
34									
35			Maximize total Profit = $32C + $24M						
36									
37			subject to						
38			Raw Material (Nylon)	3C + 2M <= 5,000 sq. ft					
39			Labor Units	(3/4)C + (2/3)M <= 1,400 hours					
40			Sales Forecast	C <= 1,000 units					
41				M <= 1,200 units					
42			and C >= 0 , M >= 0						
43									
44									

Question 1. | Graph

LEGEND	
=	3C + 2M <= 5,000 sq. ft; C >= 0; M >= 0;
=	(3/4)C + (2/3)M <= 1,400 hours; C >= 0; M >= 0;
=	M <= 1200; M > 0; C > 0;
=	C <= 1000; M > 0; C > 0;