Question 1.

	B	C	E	F	H
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				

	B	C
10	Questions:	
12	A. Decision Variables:	C = number of Collegiate units made per week
13		M = number of Mini units made per week
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
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
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
27		C. Do not exceed sales projections.
28		C<= 1,000 units
29		M<= 1,200 units
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
35		Maximize total Profit = $32C + $24M
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

Question 2.

			Weigelt Corp					
		Max Capacity / day	Available Storage / day		Profit Margin by Size	Storage Requirements / unit	Sales Forecast / day	
	Plant 1	750	13,000 sq. ft	L	420	20 sq. ft	900	
	Plant 2	900	12,000 sq. ft	M	360	15 sq. ft	1,200	
	Plant 3	450	5,000 sq. ft	S	300	12 sq. ft	750	

Questions:

A. Decision Variables

X_{PS} = number of units to produce in plant P and size S

P = 1,2,3 (3 different plants)

S = 1,2,3 (Size of product: large, medium, small)

B. LP Model

Max Profit =

$$420x_{11} + 360x_{12} + 300x_{13} + 420x_{21} + 360x_{22} + 300x_{23} + 420x_{31} + 360x_{32} + 300x_{33}$$

subject to

$$x_{11} + x_{12} + x_{13} \leq 750$$
$$x_{21} + x_{22} + x_{23} \leq 900$$
$$x_{31} + x_{32} + x_{33} \leq 450$$

Supply

$$x_{11} + x_{21} + x_{31} \leq 900$$
$$x_{12} + x_{22} + x_{32} \leq 1200$$
$$x_{13} + x_{23} + x_{33} \leq 750$$

Demand

$$20x_{11} + 15x_{12} + 12x_{13} \leq 13{,}000$$
$$20x_{21} + 15x_{22} + 12x_{23} \leq 12{,}000$$
$$20x_{31} + 15x_{32} + 12x_{33} \leq 5{,}000$$

Available Space

$$X_{PS} \geq 0 \quad \text{for all } P, S \text{ (plant, size)}$$