#1

a. Clearly define the decision variables - The decision variables are how many collegiate backpacks to produce and how many mini backpacks to produce (C and M)

b. What is the objective function? - The objective function is to maximize profit (Z)

c. What are the constraints? - The constraints are material available (5,000 feet per week shipment) labor hours available (1400 35 laborers at 40 hours/week) and sales forecast (1000 collegiate and 1200 mini)

d. Write down the full mathematical formulation for this LP problem. -

MAX : $Z = 32C + 24M$

ST : $3C + 2M \leq 5000$

$3/4C + 2/3M \leq 1400$

$C \leq 1000$

$M \leq 1200$

Z: represents profit per week

C =number of collegiate backpacks produced

M =number of mini backpacks produced

#2

a. Define the decision variables - the decision variables are the amount of large, medium and small products to produce at plants 1, 2 and 3

Xp1L :plant 1 large Xp2L :plant 2 large Xp3L: plant 3 large

Xp1M : plant 1 medium Xp2M : plant 2 medium Xp3M : plant 3 medium

Xp1S : plant 1 small Xp2S : plant 2 small Xp3S : plant 3 small

b. Formulate a linear programming model for this problem

Max : $Z = 420Xp1L + 360Xp1M + 300Xp1S + 420Xp2L + 360Xp2M + 300Xp2S + 420Xp3L + 360Xp3M + 300Xp3S$

ST:

$Xp1L + Xp1M + Xp1S \leq 750$

$Xp2L + Xp2M + Xp2S \leq 900$

$Xp3L + Xp3M + Xp3S \leq 450$

$Xp1L + Xp2L + Xp3L \leq 900$

$Xp1M + Xp2M + Xp3M \leq 1200$

$Xp1S + Xp2S + Xp3S \leq 750$

$20Xp1L + 15Xp1M + 12Xp1S \leq 13000$

$20Xp2L + 15Xp2M + 12Xp2S \leq 12000$

$20Xp3L + 15Xp3M + 12Xp3S \leq 5000$