#1

	Colgate $3 ft^2$	Mini 2
ft² of Neylon/bag:		
Max # of sales/week:	1000 sales	1200
Min of labor/bag:	45 min	40
Profit/unit:	$32	24

Decision variables:

ft² of Neylon/week: 5000 ft²
$\boxed{\text{# of Colgate bages/week} = C_1}$

# of laborers : 35
$\boxed{\text{# of Mini bags/week} = M_1}$

Hours/week per labor : 45

Hours of labor per week: 1400 × Minihts of labor per week: 84000

Objective function:

Maxmise Profit $P = C_1(32) + M_1(24)$

Nylon Constraint: $5000 \geq C_1(3) + M_1(2)$

Labor Constraint: $84000 \geq C_1(45) + M_1(40)$

Sale Constraint Max: $1000 \geq C_1$, $1200 \geq M_1$

Sale Constraint Min: $0 \leq C_1$, $0 \leq M_1$

LP Modle:

$P = C_1(32) + M_1(24)$

$5000 \geq C_1(3) + M_1(2)$

$84,000 \geq C_1(45) + M_1(40)$

$1000 \geq C_1$

$1200 \geq M_1$

$0 \leq C_1$

$0 \leq M_1$

#2

<u>Decision variables</u>: Units Produced of: $L1, L2, L3, M1, M2, M3, S1, S2, S3$

<u>Objective function</u>: Maximum Profit $P = 420(L1+L2+L3) + 360(M_1 + M_2 + M_3) + 300(S1+S2+S3)$

<u>Constraints</u>: Production: $750 \geq L1+M1+S1 \geq 0$, $900 \geq L2+M2+S2 \geq 0$, $450 \geq L3+M3+S3 \geq 0$

Storage: $13,000 \geq L1(20) + M1(15) + S1(12) \geq 0$,
$12,000 \geq L2(20) + M2(15) + S2(12) \geq 0$,
$5,000 \geq L3(20) + M3(15) + S3(12) \geq 0$

Sales: $900 \geq L1 + M1 + S1 \geq 0$, $1200 \geq L2+M2+S2 \geq 0$,
$750 \geq L3 + M3 + S3 \geq 0$

Equil % use: $\dfrac{L1+M1+S1}{750} = \dfrac{L2+M2+S2}{900}$, $\dfrac{L2+M2+S2}{900} = \dfrac{L3+M3+S3}{450}$

$$\dfrac{L1+M1+S1}{750} = \dfrac{L3+M3+S3}{450}$$

LP Modle:

$P = 420(L_1 + L_2 + L_3) + 360(M_1 + M_2 + M_3) + 300(S_1 + S_2 + S_3)$

$750 \geq L_1 + M_1 + S_1$, $\quad 0 \leq L_1 + M_1 + S_1$

$900 \geq L_2 + M_2 + S_2$, $\quad 0 \leq L_2 + M_2 + S_2$

$450 \geq L_3 + M_3 + S_3$, $\quad 0 \leq L_3 + M_3 + S_3$

$13,000 \geq L_1(20) + M_1(15) + S_1(12)$, $\quad 0 \leq L_1(20) + M_1(15) + S_1(12)$

$12,000 \geq L_2(20) + M_2(15) + S_2(12)$, $\quad 0 \leq L_2(20) + M_2(15) + S_2(12)$

$5,000 \geq L_3(20) + M_3(15) + S_3(12)$, $\quad 0 \leq L_3(20) + M_3(15) + S_3(12)$

$900 \geq L_1 + M_1 + S_1$, $\quad 0 \leq L_1 + M_1 + S_1$

$1200 \geq L_2 + M_2 + S_2$, $\quad 0 \leq L_2 + M_2 + S_2$

$750 \geq L_3 + M_3 + S_3$, $\quad 0 \leq L_3 + M_3 + S_3$

#2

LP Model Cont:

$$\frac{L_1 + M_1 + S_1}{750} = \frac{L_2 + M_2 + S_2}{900}$$

$$\frac{L_1 + M_1 + S_1}{750} = \frac{L_3 + M_3 + S_3}{450}$$

$$\frac{L_2 + M_2 + S_2}{900} = \frac{L_3 + M_3 + S_3}{450}$$