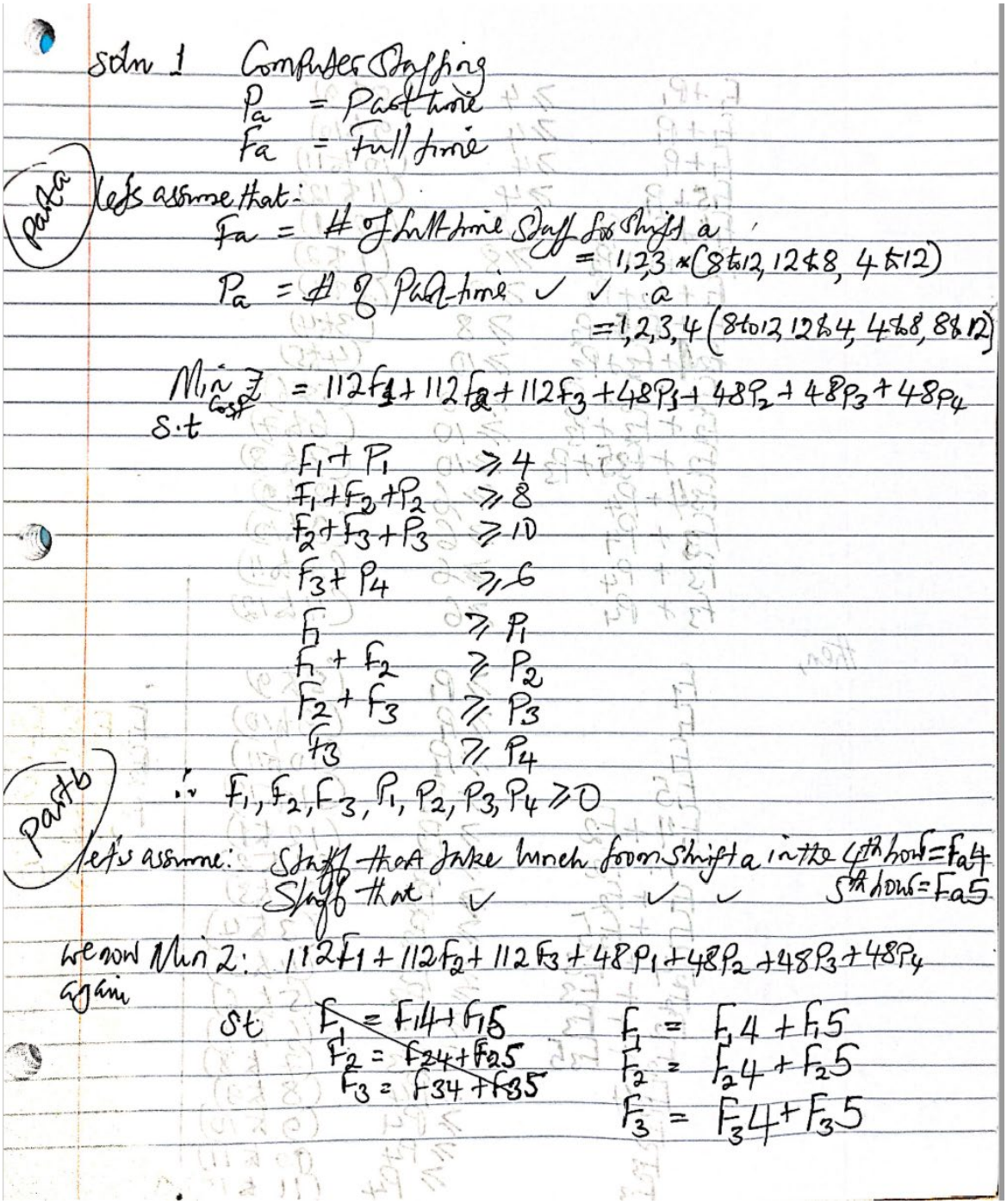
Assignment2-MIS-64018-Mukhtar

Solutions 1, 2, and 3

Other relevant pdf files are attached to my GitHub account. The link is submitted to Canvas, Prof.



$F_1 + P_1 \geq 4$ (8 & 9)
$F_1 + P_1 \geq 4$ (9 & 10)
$F_1 + P_1 \geq 4$ (10 & 11)
$F_1 + P_1 \geq 4$ (11 & 12)
$F_1 + F_2 + P_2 \geq 8$ (12 & 1)
$F_1 + F_2 + P_2 \geq 8$ (1 & 2)
$F_1 + F_2 + P_2 \geq 8$ (2 & 3)
$F_1 + F_2 + P_2 \geq 8$ (3 & 4)
$F_2 + F_3 + P_3 \geq 10$ (4 & 5)
$F_2 + F_3 + P_3 \geq 10$ (5 & 6)
$F_2 + F_3 + P_3 \geq 10$ (6 & 7)
$F_2 + F_3 + P_3 \geq 10$ (7 & 8)
$F_3 + P_4 \geq 6$ (8 & 9)
$F_3 + P_4 \geq 6$ (9 & 10)
$F_3 + P_4 \geq 6$ (10 & 11)
$F_3 + P_4 \geq 6$ (11 & 12)

$F_1 \geq P_1$ (8 & 9)
$F_1 \geq P_1$ (9 & 10)
$F_1 \geq P_1$ (10 & 11)
$F_1 \geq P_1$ (11 & 12)
$F_1 + F_2 \geq P_2$ (12 & 1)
$F_1 + F_2 \geq P_2$ (1 & 2)
$F_1 + F_2 \geq P_2$ (2 & 3)
$F_1 + F_2 \geq P_2$ (3 & 4)
$F_2 + F_3 \geq P_3$ (4 & 5)
$F_2 + F_3 \geq P_3$ (5 & 6)
$F_2 + F_3 \geq P_3$ (6 & 7)
$F_2 + F_3 \geq P_3$ (7 & 8)
$F_3 \geq P_4$ (8 & 9)
$F_3 \geq P_4$ (9 & 10)
$F_3 \geq P_4$ (10 & 11)
$F_3 \geq P_4$ (11 & 12)

F_1, F_2, F_3, F_4, F_5
P_1, P_2, P_3, P_4
≥ 0

(2) The Mathematical formula — Bayles Sawers

✓ Weekly demand of boxspack = 5,000 square feet
✓ Collegiate = x_1
Mini = x_2
$x_1 \geq 1{,}000$
$x_2 \geq 1{,}200$
✓ To maximize Profit; = $32x_1 + 24x_2$
✓ We know that 3 and 2 required sqr feed of each has a demand of 5000
✓ 1 week = 24 hrs × 7 days × 60 minutes = 10,080 minutes
1 Collegiate requires → 45 min
1 Mini ✓ → 40 min, so $35 \times 40 \times 60 = 84{,}000$ Minutes

✓ We now have: $3x_1 + 2x_2 \leq 5{,}000$
$45x_1 + 4x_2 \leq 84{,}000$
$x_1, x_2 \geq 0$

(3) Soln:
We needs define the following.
L = Large units P = Plants
M = Medium units
S = Small units.

We now define:
large units Produced/day at P_1 = L_1
Medium ✓ ✓ P_1 = M_1
Small Units ✓ @ P_1 = S_1
large units ✓ @ P_2 = L_2
Medium Units ✓ @ P_2 = M_2
Small Units ✓ @ P_2 = S_2
large Units ✓ @ P_3 = L_3
Medium Units ✓ @ P_3 = M_3
Small Units ✓ @ P_3 = S_3

The Objective function:

Max: Z $420L_1 + 360M_1 + 300S_1 + 420L_2 + 360M_2 + 300S_2$
$420L_3 + 360M_3 + 300S_3$

S.T $L_1 + M_1 + S_1 \leq 750$
$L_2 + M_2 + S_2 \leq 360$
$L_3 + M_3 + S_3 \leq 450$

Required Sqr foot:

$$20L_1 + 15M_1 + 12S_1 \leq 13{,}000$$
$$20L_2 + 15M_2 + 12S_2 \leq 12{,}000$$
$$20L_3 + 15M_3 + 12S_3 \leq 5{,}000$$

Sales forecast

$$L_1 + L_2 + L_3 \leq 900$$
$$M_1 + M_2 + M_3 \leq 1{,}200$$
$$S_1 + S_2 + S_3 \leq 750$$

Management decided that Plants should use some % of their excess capacity & Produce new Product; therefore

$$\tfrac{1}{750}(L_1 + M_1 + S_1) - \tfrac{1}{450}(L_3 + M_3 + S_3) = 0$$
$$\tfrac{1}{750}(L_1 + M_1 + S_1) - \tfrac{1}{900}(L_2 + M_2 + S_2) = 0$$
$$\tfrac{1}{900}(L_2 + M_2 + S_2) - \tfrac{1}{750}(L_1 + M_1 + S_1) = 0$$

NN:

$$L_1 \geq 0,\ M_1 \geq 0,\ S_1 \geq 0$$
$$L_2 \geq 0,\ M_2 \geq 0,\ S_2 \geq 0$$
$$L_3 \geq 0,\ M_3 \geq 0,\ S_3 \geq 0$$

Solve this ~~graphically~~ using lpSolve or any other Equivalent Library in R.