Quantitative Management Modeling

Assignment No. 3

Solution:

Part 4.
Define:

Let
L1 + M1 + S1 <= 750 -----(y1)
L2 + M2 + S2 <= 900 -----(y2)
L3 + M3 + S3 <= 450 -----(y3)

20 L1 + 15 M1 + 12 S1 <= 13000 ----(y4)
20 L2 + 15 M2 + 12 S2 <= 12000 ----(y5)
20 L3 + 15 M3 + 12 S3 <= 5000 -----(y6)

L1 + L2 + L3 <= 900 -----(y7)
M1 + M2 + M3 <= 1200 -----(y8)
S1 + S2 + S3 <= 750 -----(y9)

900 L1 + 900 M1 + 900 S1 - 750 L2 - 750 M2 - 750 S2 = 0 ----(y10)
450 L1 + 450 M1 + 450 S1 - 750 L3 - 750 M3 - 750 S3 = 0 ----(y11)

Objective Function:

Min Z: +750 y1 + 900 y2 + 450 y3 + 13000 y4 + 12000 y5 + 5000 y6 + 900 y7 + 1200 y8 + 750 y9 + 0 y10 + 0 y11;

Constraints:

Subject to:

y1 + 20 y4 + y7 + 900 y10 + 450 y11 >= 420;
y1 + 15 y4 + y8 + 900 y10 + 450 y11 >= 360;
y1 + 12 y4 + y9 + 900 y10 + 450 y11 >= 300;
y2 + 20 y5 + y7 - 750 y10 >= 420;
y2 + 15 y5 + y8 - 750 y10 >= 360;
y2 + 12 y5 + y9 - 750 y10 >= 300;
y3 + 20 y6 + y7 - 750 y11 >= 420;

y3 + 15 y6 + y8 - 750 y11 >= 360;
y3 + 12 y6 + y9 - 750 y11 >= 300;

non-negativity

y1, y2, y3, y4, y5, y6, y7, y8, y9 >= 0
y10, y11 = unrestricted

The solution agrees with the Primal problem. The dual problem LP and R file has been attached.