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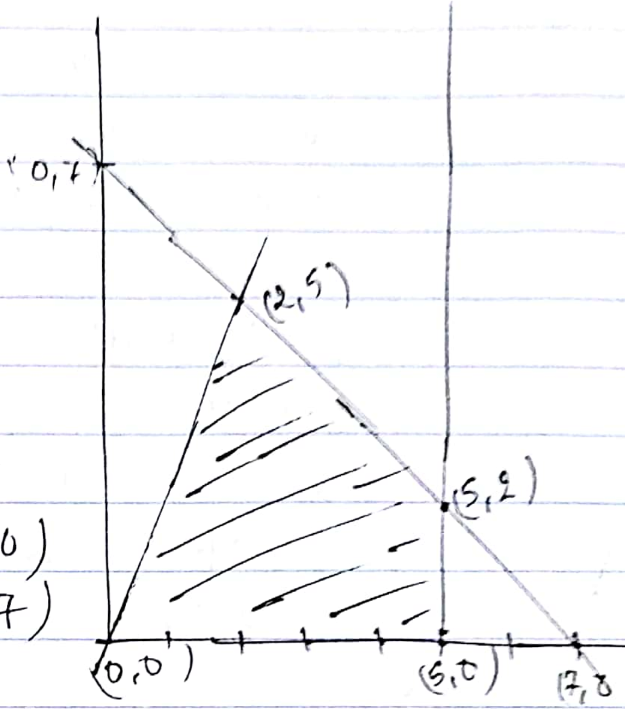
7.1 Solution

Maximize $5x + 3y$

$5x - 2y \geq 0$ $\quad$ $x \leq 5$

$x + y \leq 7$ $\quad$ $y \geq 0$

$x \geq 0$



$5x - 2y = 0$

$5x = 2y, y = 0$

$x = 0$

$x + y = 7$

$x = (7, 0)$

$y (0, 7)$

Testing all map points $(0,0)$ $(2,5)$ $(5,2)$ $(5,0)$

On $(0,0) = 5x + 3y = 0$

On $(2,5) = 5 \cdot 2 + 3 \cdot 5 = 25$

On $(5,2) = 5 \cdot 5 + 3 \cdot 2 = 31$

On $(5,0) = 5 \cdot 5 + 3 \cdot 0 = 25$

So, the optimal solution is 31 at $(5, 2)$ #

7.2 Solution

let x and y be the amount of buckwheat transported from Kansas to Newyork and Mexico to Newyork respectively.

Now, Maximize the following

$x \cdot 2 + (15 - x) \cdot 3 + y \cdot 4 + (8 - y) \cdot 1$

$2x + 45 - 3x + 4y + 8 - y = 3y - x + 53$

Problem 3

7.3 let V_1, V_2, V_3 be the volume of the 3 materials and m_1, m_2 and m_3 be the weights of the 3 materials respectively

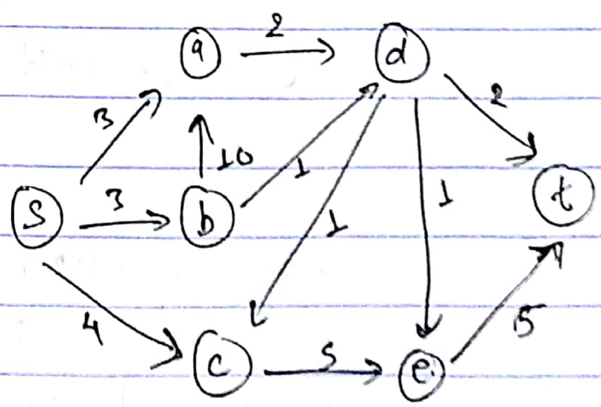
$0 \leq V_1 \leq 40$
$0 \leq V_2 \leq 30$
$0 \leq V_3 \leq 20$

Now, Maximize

$1000 \cdot V_1 + 1200 \cdot V_2 + 12000\, V_3$

where $V_1 + V_2 + V_3 \leq 60$
And $2M_1 + M_2 + 3M_3 \leq 100$

7.4 a) Problem 4



$0 \leq f_{sa} \leq 3$
$0 \leq f_{sb} \leq 3$ | $0 \leq f_{dc} \leq 1$
$0 \leq f_{sc} \leq 4$
$0 \leq f_{ad} \leq 2$
$0 \leq f_{ba} \leq 10$
$0 \leq f_{bd} \leq 1$
$0 \leq f_{dt} \leq 2$
$0 \leq f_{de} \leq 1$
$0 \leq f_{ce} \leq 5$
$0 \leq f_{et} \leq 5$

Maximize:

$f_{sa} + f_{sb} + f_{sc}$

$f_{sa} + f_{ba} = f_{ad}$
$f_{sb} = f_{ba} + f_{bd}$
$f_{sc} + f_{dc} = f_{ce}$

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Problem 5:

Create a variable for each gate g with constraints.

x_0 = AND gate

$0 \le x_0 \le 1$

$x_0 \le x_n$

$x_0 \le x_n'$

$x_0 \ge x_n + x_n' - 1$

x_1 = OR gate.

$0 \le x_1 \le 1$

$x_1 \ge x_n$

$x_1 \ge x_n'$

$x_1 \le x_n + x_n'$

x_2 = NOT gate.

$x_2 = 1 - x_n$

x_3 = OR gate

$0 \le x_3 \le 1$

$x_3 \ge x_n$

$x_3 \ge x_n'$

$x_3 < x_n + x_n'$

x_4 = NOT gate

$x_4 = 1 - x_n$

x_5 = AND gate

$0 \le x_5 \le 1$

$x_5 \le x_n$

$x_5 \le x_n'$

$x_5 \ge x_n + x_n' - 1$

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