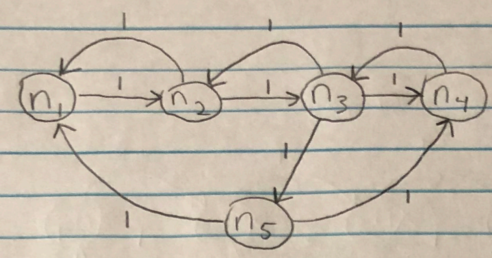
Original Graph:



All possible cycles:

$c_1 = \langle n_1, n_2 \rangle$ $\quad$ $c_4 = \langle n_1, n_2, n_3, n_5 \rangle$

$c_2 = \langle n_2, n_3 \rangle$ $\quad$ $c_5 = \langle n_3, n_5, n_4 \rangle$

$c_3 = \langle n_3, n_4 \rangle$

Optimal Solution $m^* = \{c_1, c_5\}$

Integer Programming Formulation (cycle-formulation):

MAX $2x_1 + 2x_2 + 2x_3 + 4x_4 + 3x_5$

Subject to:

(n_1) $\quad x_1 + x_4 \leq 1$

(n_2) $\quad x_1 + x_2 + x_4 \leq 1$

(n_3) $\quad x_2 + x_3 + x_4 + x_5 \leq 1$

(n_4) $\quad x_3 + x_5 \leq 1$

(n_5) $\quad x_4 + x_5 \leq 1$

$\quad x_1, x_2, x_3, x_4, x_5 \in \{0, 1\}$

Dual Values:

n_1: $5 - 5 = 0$

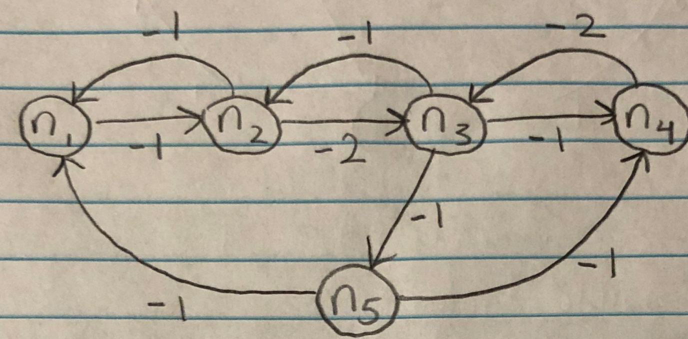
n_2: $5 - 5 = 0$

n_3: $5 - 6 = -1$

n_4: $5 - 5 = 0$

n_5: $5 - 5 = 0$

Reduced Graph :



$(n_1, n_2) : 0 - 1 = -1$
$(n_2, n_1) : 0 - 1 = -1$
$(n_2, n_3) : -1 - 1 = -2$
$(n_3, n_2) : 0 - 1 = -1$
$(n_3, n_4) : 0 - 1 = -1$
$(n_4, n_3) : -1 - 1 = -2$
$(n_3, n_5) : 0 - 1 = -1$
$(n_5, n_1) : 0 - 1 = -1$
$(n_5, n_4) : 0 - 1 = -1$