Assignment No5 (With extra explanations :))

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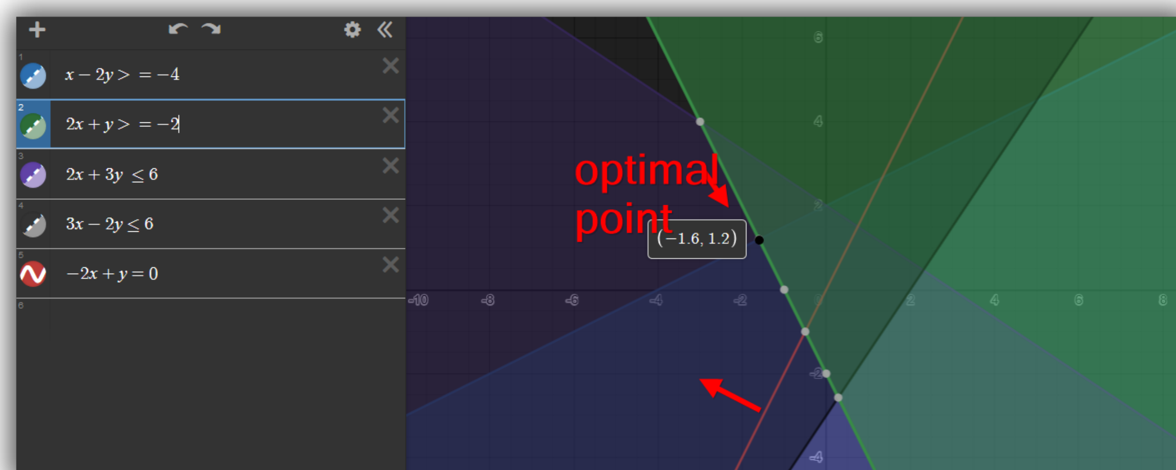
Q1)
$Notation: X1 = x$ & $X2 = y.$
$maxz = -2x + y$
$s.t.$
$x - 2y >= -4$
$2x + y >= -2$
$2x + 3y <= 6$
$3x - 2y <= 6$
free x
free y



For solving this problem by Simplex method, first we need to rewrite it in the canonical form: Step one:
notations:
$x = xo - xt; xo \vee xt >= 0$

$y = yo - yt; yo \vee yt >= 0$
$maxz = -2xo + 2xt + y0 - yt$
$s.t.$
$-xo + xt + 2yo - 2yt + e1 = +4$
$-2xo + 2xt - yo + yt + e2 = +2$
$+2xo - 2xt + 3yo - 3yt + s1 = 6$
$3xo - 3xt - 2yo + 2yt + s2 = 6$
$xo, xt, yo, yt, e1, e2, s1, s2 >= 0$

basis

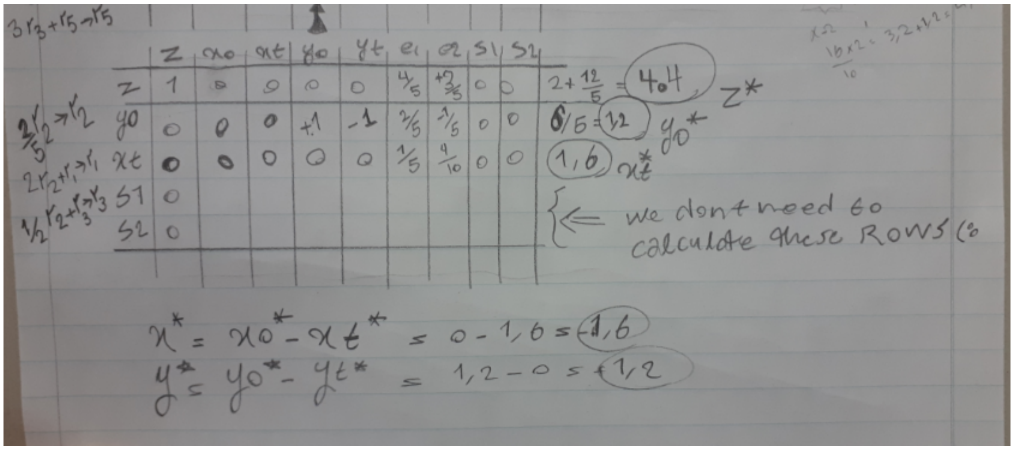
	Z	xo	xt	yo	yt	e1	e2	s1	s2	RHS
Z	1	+2	−2	−1	+1	0	0	0	0	0
e1	0	−1	+1	2	−2	1	0	0	0	4
e2	0	−2	+2	−1	+1	0	1	0	0	2
s1	0	+2	−2	+3	−3	0	0	1	0	6
s2	0	3	−3	−2	2	0	0	0	1	6

$\text{Min}\{\frac{4}{1}, \frac{2}{2}\} = \frac{2}{2}$

	Z	xo	xt	yo	yt	e1	e2	s1	s2	RHS
Z	1	0	0	−2	2	0	1	0	0	2
e1	0	0	0	5/2	−5/2	1	−1/2	0	0	3
xt	0	−1	1	−1/2	1/2	0	1/2	0	0	1
s1	0	0	0	+2	−2	0	1	0	0	10
s2	0	0	0	−7/2	7/2	0	3/2	0	0	12

$\frac{1}{2} r_3 \to r_3$
$-r_3 + r_2 \to r_2$
$2r_3 + r_1 \to r_1$
$2r_3 + r_4 \to r_4$
$3r_3 + r_5 \to r_5$

$\text{Min}\{\frac{3}{5/2} = \frac{6}{5}, 10/2 = 5\}$



Q2)
We have not satisfied “optimality condition” in our table.
because, there is positive term in the objective function row. So X2 should leave NBV and replace with one of basis that satisfi “Minimum test”.
PartA)
if “α”be positive then winner of “Minimum test” will always be last row. and its RHS ramain zero and our next solution will be “Degenerated solution”.
if we want to reach non Degenerated solution first α should not be positive.
and also it can not be zero too.Due to same reason(RHS=0).
So α must be negative constant real number.
partB)
if “α”be positive then winner of “Minimum test” will always be last row. and its RHS ramain zero and our next solution will be “Degenerated solution”.
and also if α be zero we will still have a Zero at the RHS of our last row.
So α must be non negative constant real number.
and if we check it we can make sure it’s same as our last Degenerated solution.
it means equal to $(2, 0, 4, 0, 0)$.