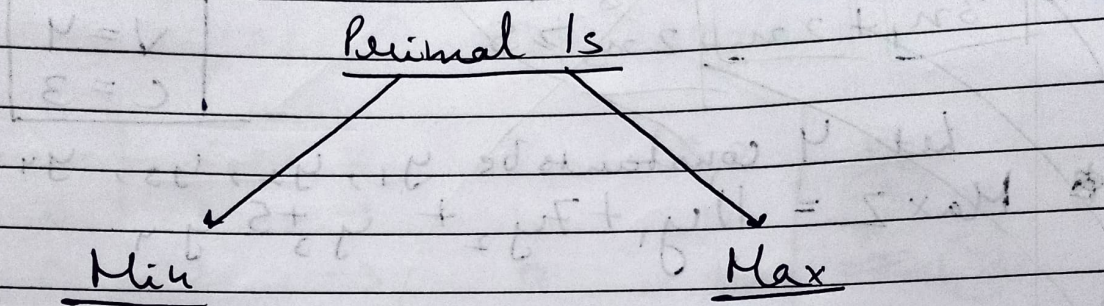


Duality

⇒ LPP is primal and its reverse is dual, Primal (min)
then dual (max)
Primal to Dual



$$Z = 2x_1 + 4x_2 + 3x_3 \geq 11$$

all signs are $\geq$
and
all signs are greater
 $\geq$

change sign by multiply by $(-)$ for
complex eqⁿ

Check how many variables and constraints

$$3x_1 + 4x_2 + 3x_3 \geq 11 \rightarrow \text{constraints}$$

Numbers of variable and constraints will
be interchanged

variables become constraints's variable in
obj. eqⁿ and $(11 - 10)$

$$\text{Min } Z = 2x_1 + 4x_2 + 3x_3$$

$$3x_1 + 4x_2 + 3x_3 \geq 11$$

$$2x_1 + 3x_2 - 2x_3 \geq 7$$

$$-x_1 + 2x_2 + 3x_3 \geq 1$$

$$3x_1 + 2x_2 + 2x_3 \geq 5$$

$$V = 4$$

$$C = 3$$

Let 4 constants be y_1, y_2, y_3, y_4

$$\text{Max } Z = 11y_1 + 7y_2 + y_3 + 5y_4$$

$$3y_1 + 2y_2 - y_3 + 3y_4 \leq 2$$

$$4y_1 + 3y_2 + 2y_3 + 2y_4 \leq 4$$

$$y_1 - 2y_2 + 3y_3 + 2y_4 \leq 3$$

$$y_1, y_2, y_3, y_4 \geq 0 \text{ (always)}$$

* If $2x_1 + x_2 - x_3 = 4$ is given then 2 eqⁿ will be formed

$$\left. \begin{array}{l} 2x_1 + x_2 - x_3 \leq 4 \\ 2x_1 + x_2 - x_3 \geq 4 \end{array} \right\} \text{ for these in new eqⁿ variable will be } y'_1, y''_1$$

when new eqⁿ will be formed

$(y'_1 - y''_1)$ will be replaced by y_1

Dual-Simplex

Only possible if Max z is given and $\leq$

Q Max $Z = -3x_1 - x_2$ $+s_1 + 0s_2$
 $x_1 + x_2 \geq 1 \Rightarrow -x_1 - x_2 \leq -1$
 $2x_1 + 3x_2 \geq 2 \Rightarrow -2x_1 - 3x_2 \leq -2$ $+s_2 + 0s_1$

Base	x_1	x_2	s_1	s_2	b_i
s_1 0	-1	-1	1	0	-1
s_2 0	-2	-3	0	1	-2
c_j	-3	-1	0	0	
z_j	0	0	0	0	
$c_j - z_j$	-3 Max	-1	0	0	
$\Rightarrow$ Max	$\frac{-3}{-2} = \frac{3}{2}$	$\frac{-1}{-3} = \frac{1}{3}$			

All $c_j - z_j$ should be either -ve or 0
 otherwise it won't proceed

Check lowest -ve no. under b_i

~~we don't consider b_i if positive~~

we will keep making table till all are +ve in b_i

Now we will find Maximum ratio

Now solve manually. s_2 will go out
 and make $-2 = 1$ and $-1 = 0$