$$
\begin{aligned}
\max \quad & x_1 + x_2 \\
\text{s.t.} \quad & x_1 \le 1 \\
& x_2 \le 1 \\
& x_2 \ge 2 \\
& x_1, x_2 \ge 0
\end{aligned}
$$

Convert to st. form:

$$
\begin{aligned}
\max \quad & x_1 + x_2 \\
\text{s.t.} \quad & x_1 \le 1 \\
& x_2 \le 1 \\
& -x_2 \le -2 \\
& x_1, x_2 \ge 0
\end{aligned}
$$

Aux. problem :

$$\begin{array}{llcrl}
\max & & & -x_0 & \\
\text{s.t.} & x_1 & & -x_0 & \leq 1 \\
& & x_2 & -x_0 & \leq 1 \\
& & -x_2 & -x_0 & \leq -2 \\
& & x_1, x_2, x_0 & & \geq 0
\end{array}$$

$$\begin{array}{lcrrrr}
\mathcal{L} & = & & & & -x_0 \\
\hline
w_1 & = & 1 & -x_1 & & +x_0 \\
w_2 & = & 1 & & -x_2 & +x_0 \\
w_3 & = & -2 & & +x_2 & +x_0
\end{array}$$

$$
\begin{array}{lllll}
\mathcal{L} & = -2 & & + \overset{0}{x_2} & - w_3 \\
\hline
w_1 & = 3 & - x_1 & + x_2 & + w_3 \\
w_2 & = 3 & - x_1 & - 2x_2 & + w_3 \\
x_0 & = 2 & & - x_2 & + w_3
\end{array}
$$

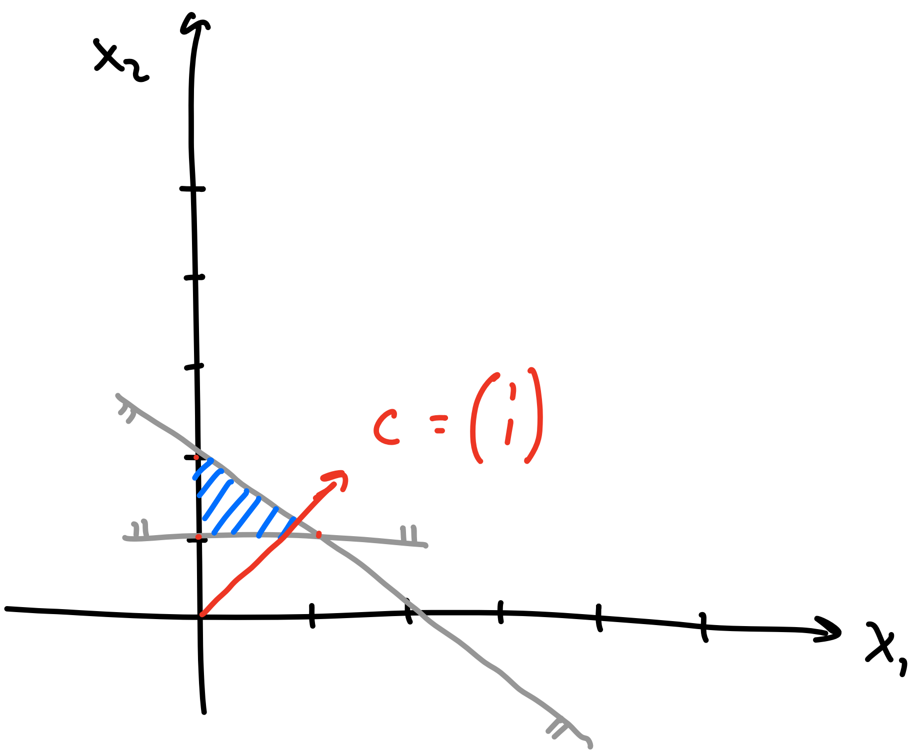
$$w_2 = 3 - x_1 - 2x_2 + w_3$$

$$\Rightarrow x_2 = \frac{3}{2} - \frac{1}{2}x_1 - \frac{1}{2}w_2 + \frac{1}{2}w_3$$

$$\mathcal{L} = -2 + \frac{3}{2} - \frac{1}{2}x_1 - \frac{1}{2}w_2 + \frac{1}{2}w_3 - w_3$$

$$= -\frac{1}{2} - \frac{1}{2}x_1 - \frac{1}{2}w_2 - \frac{1}{2}w_3$$

$$\max \quad x_1 + x_2$$
$$\text{s.t.} \quad x_1 + x_2 \le 2$$
$$x_2 \ge 1$$



$$\begin{aligned} \max \quad & x_1 + x_2 \\ \text{s.t.} \quad & x_1 + x_2 \le 2 \\ & -x_2 \le -1 \end{aligned} \qquad (P)$$

$$\begin{aligned} \max \quad & -x_0 \\ \text{s.t.} \quad & x_1 + x_2 - x_0 \le 2 \\ & -x_2 - x_0 \le -1 \\ & x_1, x_2, x_0 \ge 0 \end{aligned} \qquad (AP)$$

$$\begin{array}{l} \mathcal{L} = \qquad\qquad\qquad\qquad -x_0 \\ \hline w_1 = 2 - x_1 - x_2 + x_0 \\ w_2 = -1 \qquad\;\; + x_2 + x_0 \end{array}$$

$$w_2 = -1 + x_2 + x_0$$

$$\Rightarrow -x_0 = -1 + x_2 - w_2$$

$$x_0 = 1 - x_2 + w_2$$

$$\begin{array}{l}
\ell = -1 + x_2 - w_2 \\
\hline
w_1 = 3 - x_1 - 2x_2 + w_2 \\
x_0 = 1 - x_2 + w_2
\end{array}$$

$$x_2 = 1 - x_0 + w_2$$

$$\begin{aligned}
w_1 &= 3 - x_1 - 2(1 - x_0 + w_2) + w_2 \\
&= 3 - x_1 - 2 + 2x_0 - 2w_2 + w_2 \\
&= 1 - x_1 + 2x_0 - w_2
\end{aligned}$$

$$
\begin{array}{rcrrrr}
\xi & = & & & -x_0 & \\
\hline
w_1 & = & 1 & -x_1 & +2x_0 & -w_2 \\
x_2 & = & 1 & & -x_0 & +w_2
\end{array}
$$

CORRECT!

$$
\begin{aligned}
\zeta &= x_1 + x_2 \\
&= x_1 + 1 - x_0 + w_2
\end{aligned}
$$

$$\begin{array}{rcl} \zeta & = & 1 + x_1 + w_2 \\ \hline w_1 & = & 1 - x_1 - w_2 \\ x_2 & = & 1 \qquad\quad + w_2 \end{array}$$

$w_1 = 1 - x_1 - w_2 \Rightarrow x_1 = 1 - w_1 - w_2$

$\zeta = 1 + 1 - w_1 - w_2 + w_2$

$= 2 - w_1$

$$\begin{array}{rcl} \zeta & = & 2 - w_1 \\ \hline x_1 & = & \boxed{1} - w_1 - w_2 \\ x_2 & = & \boxed{1} \qquad\quad + w_2 \end{array}$$

Optimal for (P)

$x^o = \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \; c^T x^o = 1 \cdot 1 + 1 \cdot 1 = \underline{\underline{2}}$