9\18\13

| B.V. | $X_1$ | $X_2$ | $X_3$ | $x_4$ | RHS |
|---|---|---|---|---|---|
| $X_0$ | | 1/4 | | 3/4 | 33/4 |
| $X_3$ | | 1/2 | 1 | -1/2 | 3/2 |
| $X_1$ | 1 | 3/4 | | 1/4 | 11/4 |

$\frac{1}{4}X_2 + \frac{3}{4}X_4 \geq \frac{1}{4}$

| B.V. | $x_1$ | $x_2$ | $x_3$ | $x_4$ | $x_5$ | RHS |
|---|---|---|---|---|---|---|
| $x_0$ | | 1/4 | | 3/4 | | 33/4 |
| $x_3$ | | 1/2 | 1 | -1/2 | | 3/2 |
| $x_1$ | 1 | 3/4 | | 1/4 | | 11/4 |
| $x_5$ | | * -1/4 | | -3/4 | 1 | -1/4 |

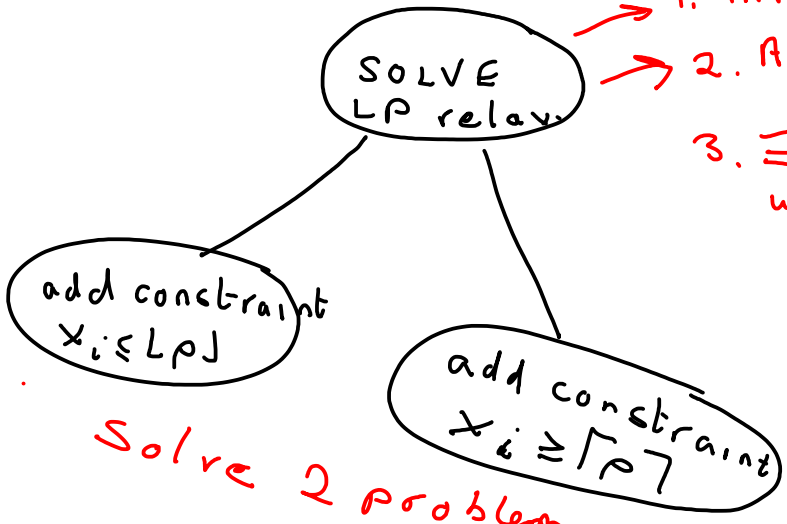
$\frac{1}{4}x_2 + \frac{3}{4}x_4 \geq \frac{1}{4}$

also integer variable

| B.V. | $X_1$ | $X_2$ | $X_3$ | $x_4$ | $x_5$ | RHS |
|---|---|---|---|---|---|---|
| $X_0$ | | | | | 1 | 8 |
| $X_3$ | | | 1 | −2 | | 5 |
| $X_1$ | 1 | | | −2 | | 2 |
| $X_2$ | | 1 | | 3 | −4 | 1 |

OPTIMAL: $X_1=0$, $X_2=1$ : $X_0=8$.

# Branch & Bound




Solve 2 problems

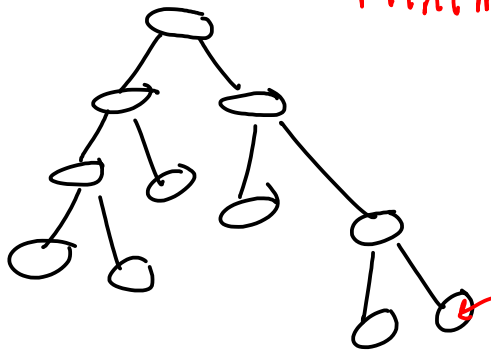
1. Infeasible ✓
2. All integer variables are integer ✓
3. $\exists$ integer variable $x_i$ which has non-integer value.

Choose such an $X_i$.

Suppose its value is $p$

Have to solve problems at the leaves.

Minimise

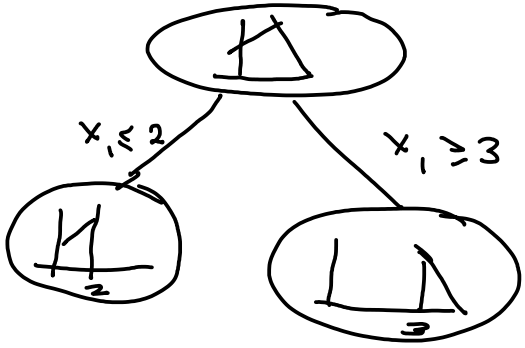


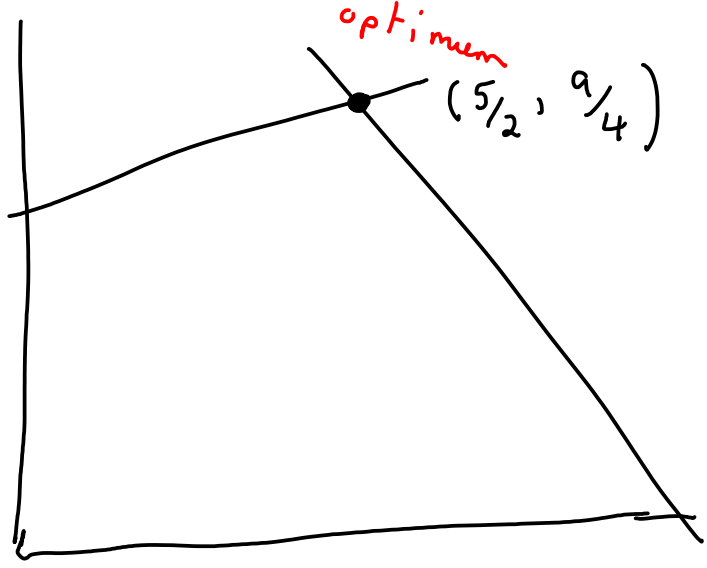
re-solve LP relaxation

1. Infeasible ✓
2. Integral ✓
3. Suppose we have a solution of value $v$.

Suppose LP value $w \geq v$. ✓

4. $w < v$ & branch

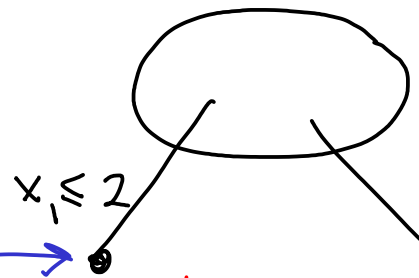

$x_1 \leq 2$
$x_1 \geq 3$
2
3


optimum
$(5/2, 9/4)$

Maximise $3x_1 + 2x_2$

s.t. $2x_1 + 3x_2 \leq 7$

$4x_1 + 3x_2 \leq 11$




For the LP here

$x_1 = 2$ $\quad 3x_2 \leq 7 - 4$

$3x_2 \leq 11 - 8$ max.