

FIT3158 Note - W4 ILP - Binary Problem

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Big M - Fix cost problem

We use big m when there is a need to consider a fixed cost. Let's say product A needs a production set-up cost. So, when we produce A, we not only need the unit cost, but also the set-up cost. In another word, the total cost of product A = unit cost + set-up cost.

The Big M is a constraint where $.Y_1 = 1$, when we produce A; it is like a trigger.

- Consider the resource constraints
$$\begin{array}{ll} 2X_1 + 3X_2 + 6X_3 \leq 600 & \text{ } \} \text{ machining} \\ 6X_1 + 3X_2 + 4X_3 \leq 300 & \text{ } \} \text{ grinding} \\ 5X_1 + 6X_2 + 2X_3 \leq 400 & \text{ } \} \text{ assembly} \end{array}$$
- What is the maximum value X_1 can assume?
Let $X_2 = X_3 = 0$
$$\begin{array}{ll} X_1 = \text{MIN}(600/2, 300/6, 400/5) & \text{Get the ratio,} \\ = \text{MIN}(300, 50, 80) & \text{assumed we don't} \\ = 50 & \text{produce P2 \& P3} \end{array}$$

To determine the value of M — an upper bound on x — we can make use of our constraints from the constraints by getting potential upper bounds on our x value, then we select the one that we can use.