Network Optimization
Assignment #1

Let V be the set of n jobs that must be produced, and T the set of m tools.

Consider a bipartite graph G (V, T, E) in which (j, t) E iff job j requires tool t to be produced.

Given a set $S \subseteq V$, we denote by $T(S)$ the image of S, that is, the set of tools required by at least one job in S. We write $T(j) = T(\{j\})$ to denote the tools required by job j.

If and only if *all* the tools in $T(S)$ are loaded in the tool magazine, can all the jobs in S be performed. Let $r_j \geq 0$ denote the revenue of job j, and $r_t \geq 0$ the cost of a tool t and C the overall budget.

The problem consists in deciding which tools to allocate in the tool magazine to maximize the profit (i.e, revenue of the jobs that can then be produced – tools cost), without violating the budget C.

Write a notebook with an ILP formulation of the problem and perform some experiments.