## **Project Selection**

#### Project selection problem:

- Set P of possible projects. Project v has an associated profit p<sub>v</sub> (can be positive or negative).
- Some projects have requirements (taking course EA2 requires course EA1).
- Dependencies are modelled in a graph. Edge (u, v) means "can't do project u without also doing project v."
- A subset A of projects is feasible if the prerequisites of every project in A also belong to A.

Goal: Find a feasible set of projects that maximizes the profit.



## **Project Selection**

### The prerequisite graph:

- $\{x, a, z\}$  is a feasible subset.
- $\{x, a\}$  is infeasible.





# **Project Selection**

### Mincut formulation:

- Edges in the prerequisite graph get infinite capacity.
- ► Add edge (s, v) with capacity p<sub>v</sub> for nodes v with positive profit.
- ► Create edge (v, t) with capacity -pv for nodes v with negative profit.





#### Theorem 2

A is a mincut if  $A \setminus \{s\}$  is the optimal set of projects.

#### Proof.

• *A* is feasible because of capacity infinity edges.

