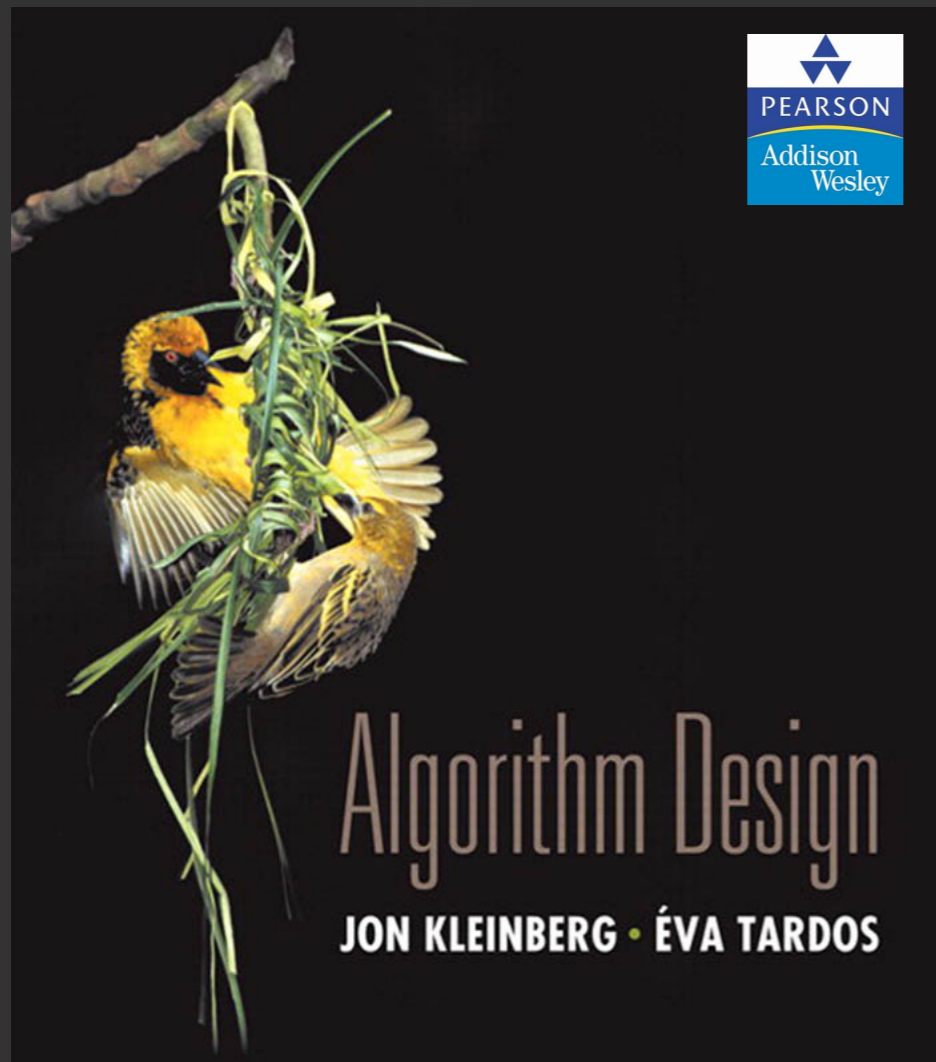


4. GREEDY ALGORITHMS II

- ▶ *Edmonds branching algorithm demo*



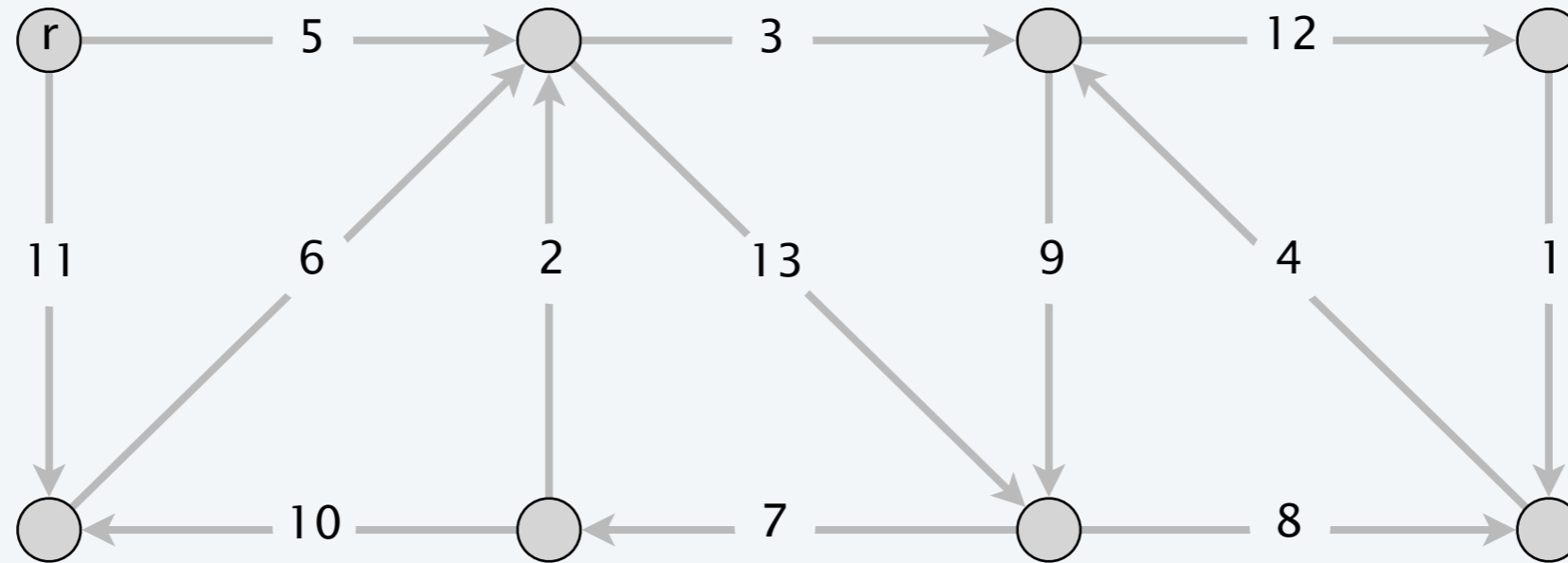
Lecture slides by Kevin Wayne

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<http://www.cs.princeton.edu/~wayne/kleinberg-tardos>

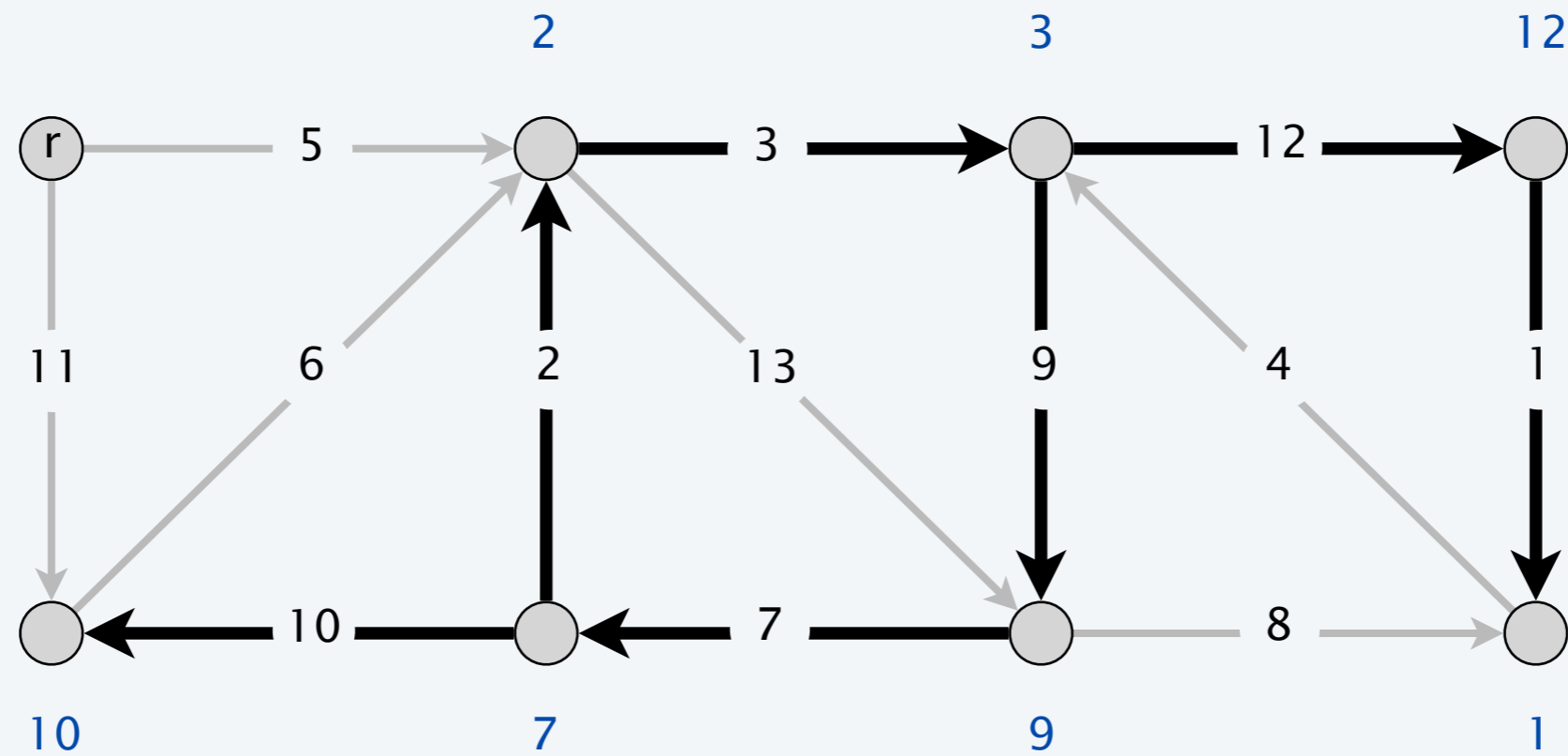
Edmonds branching algorithm demo

input digraph $G = (V, E)$



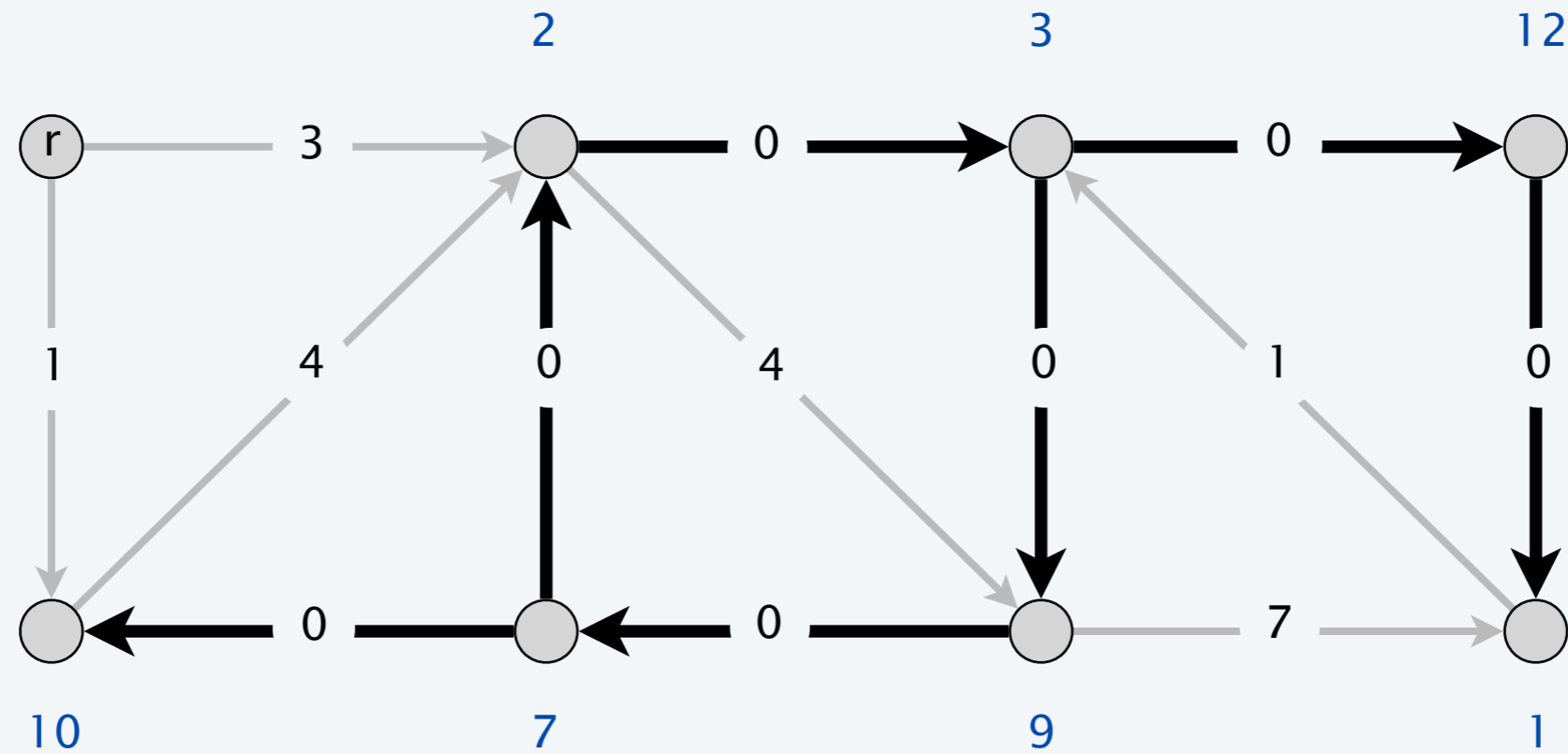
Edmonds branching algorithm demo

Phase 1: find cheapest edge entering each node



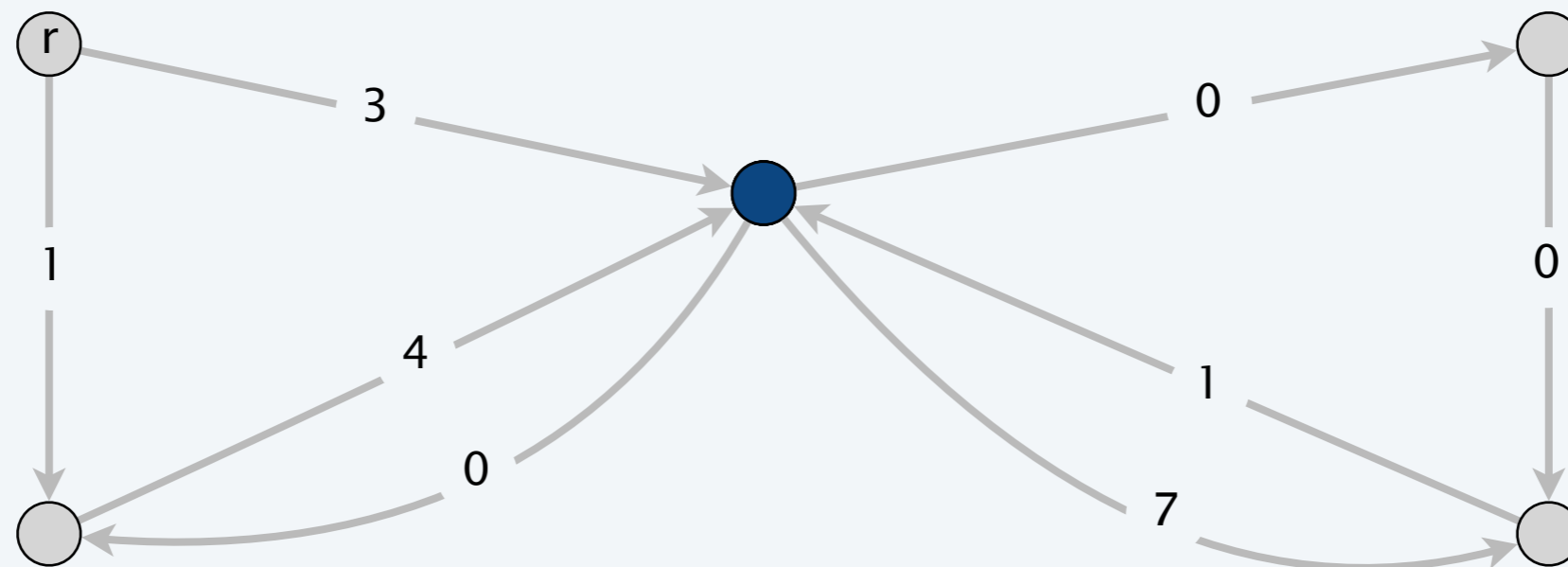
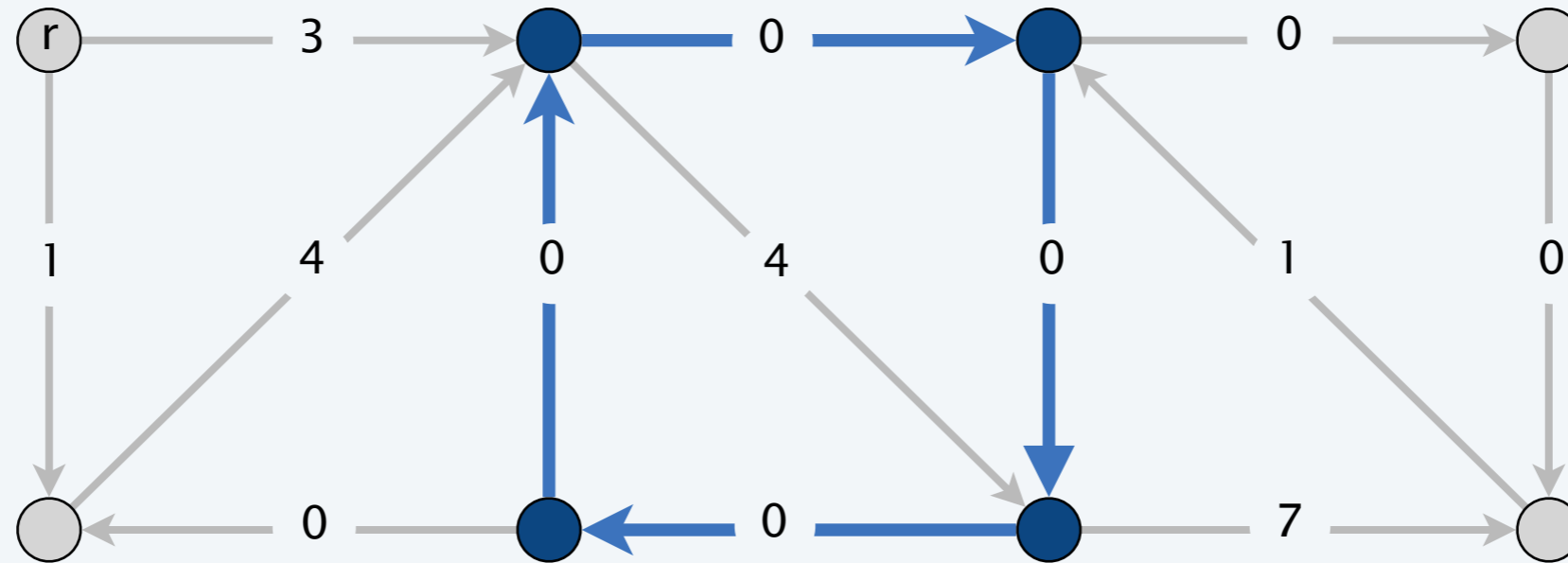
Edmonds branching algorithm demo

Phase 1: replace costs with reduced costs



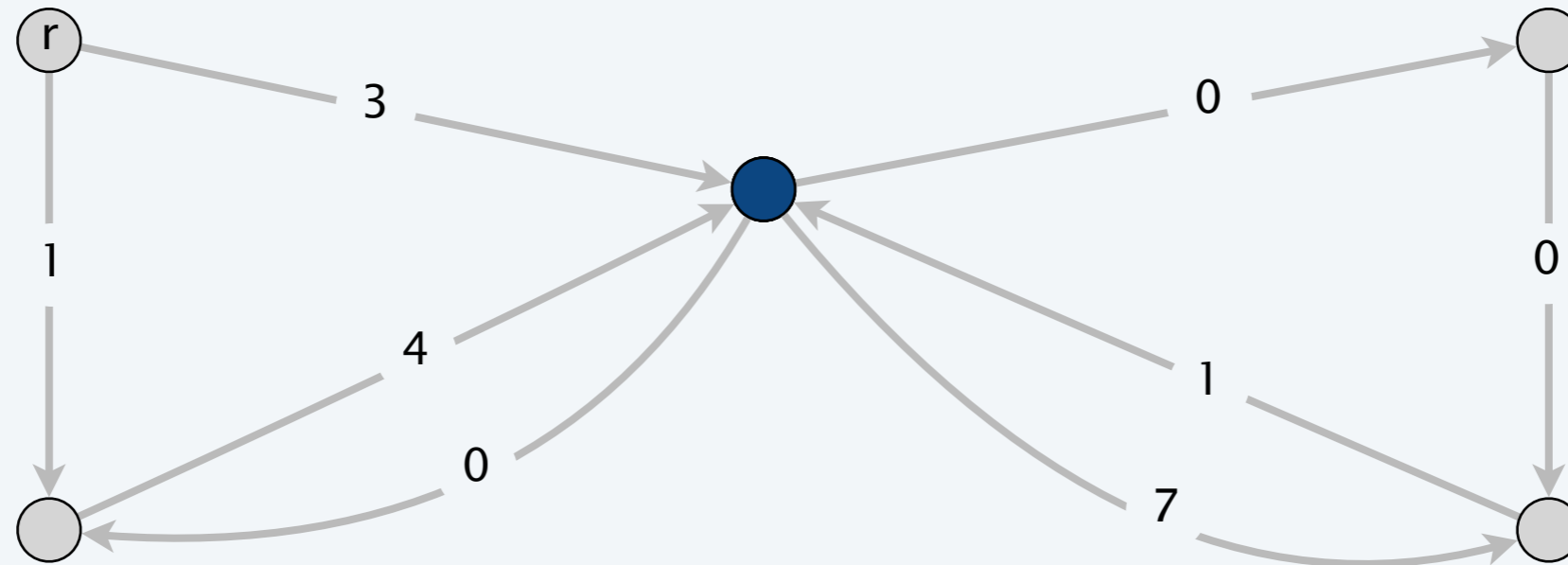
Edmonds branching algorithm demo

Phase 1: find 0-cost directed cycle C and contract



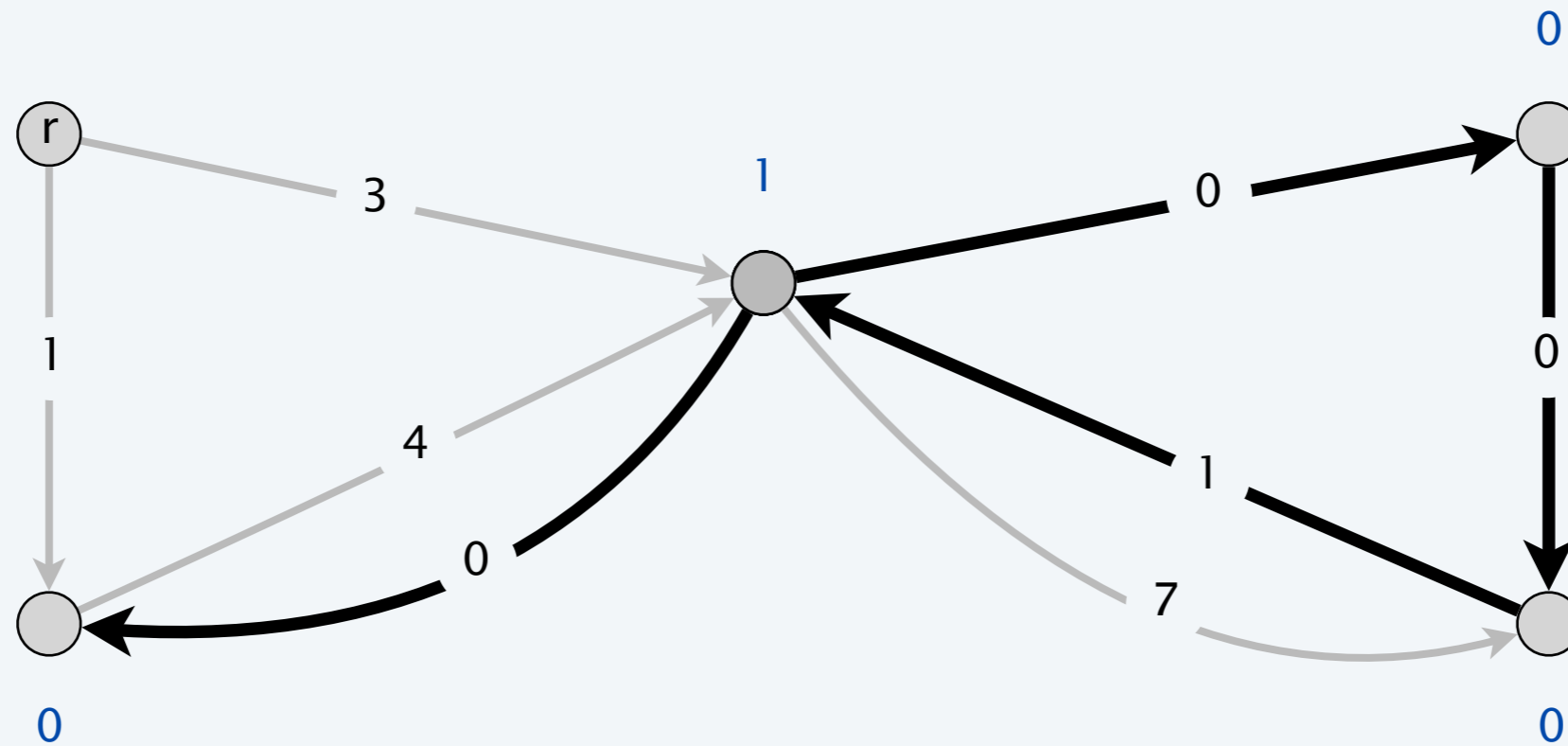
Edmonds branching algorithm demo

Phase 2: digraph G'



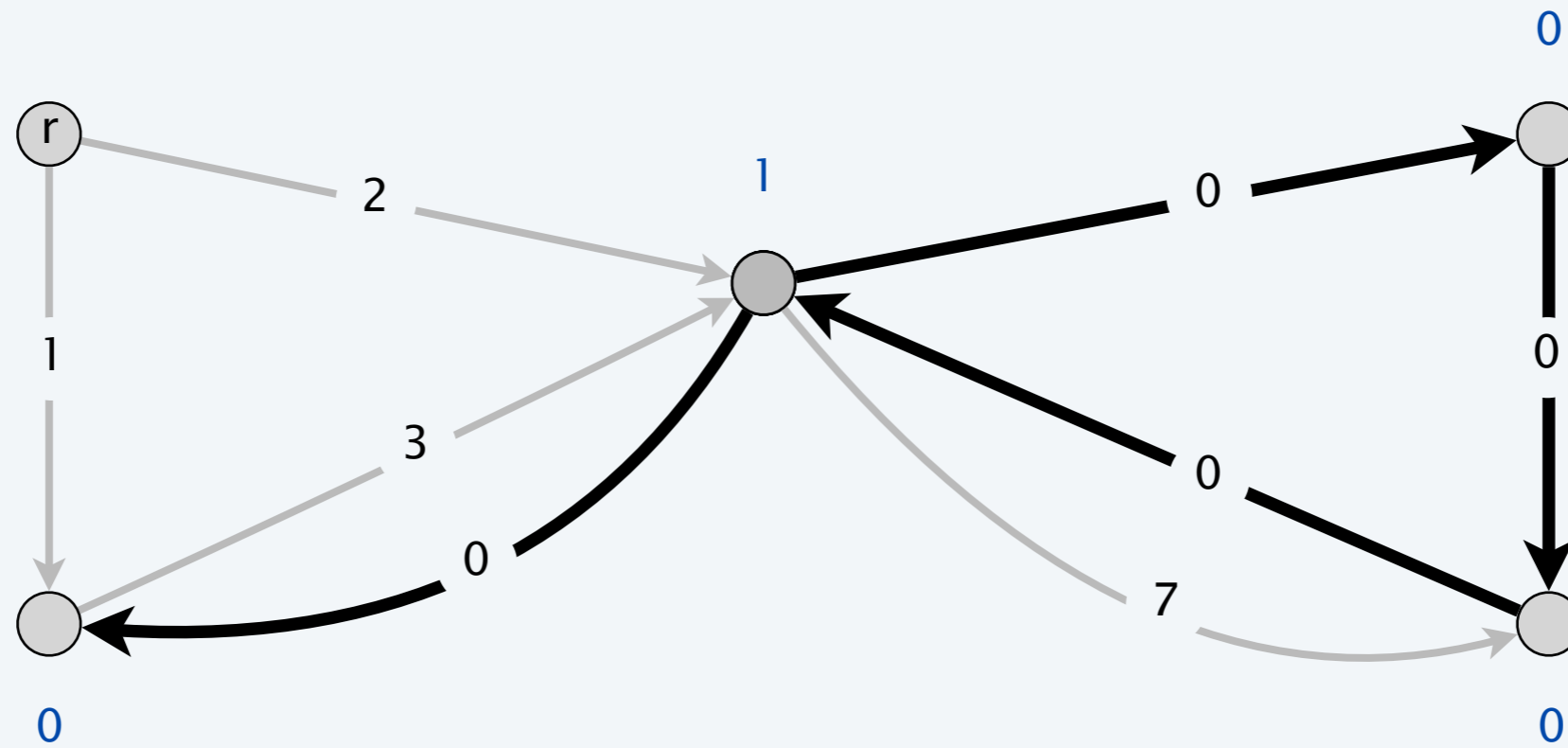
Edmonds branching algorithm demo

Phase 2: find cheapest edge entering each node



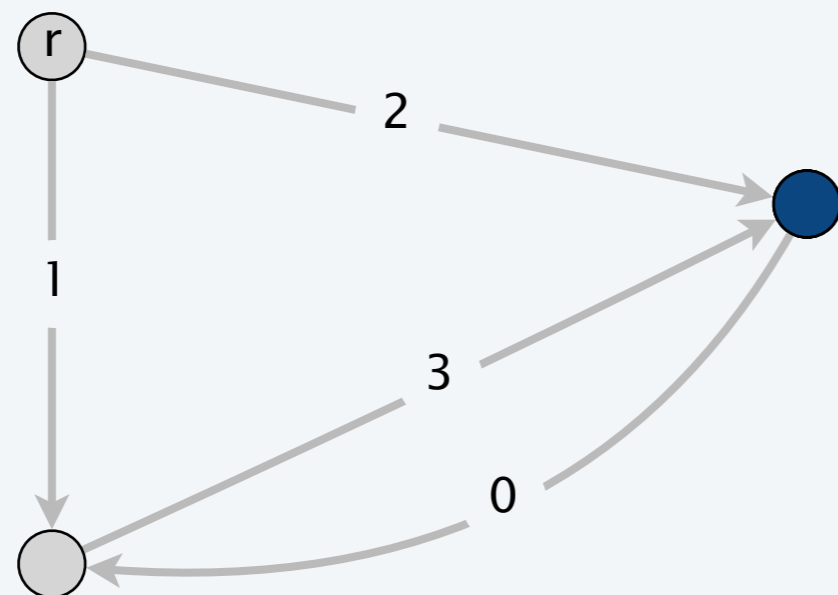
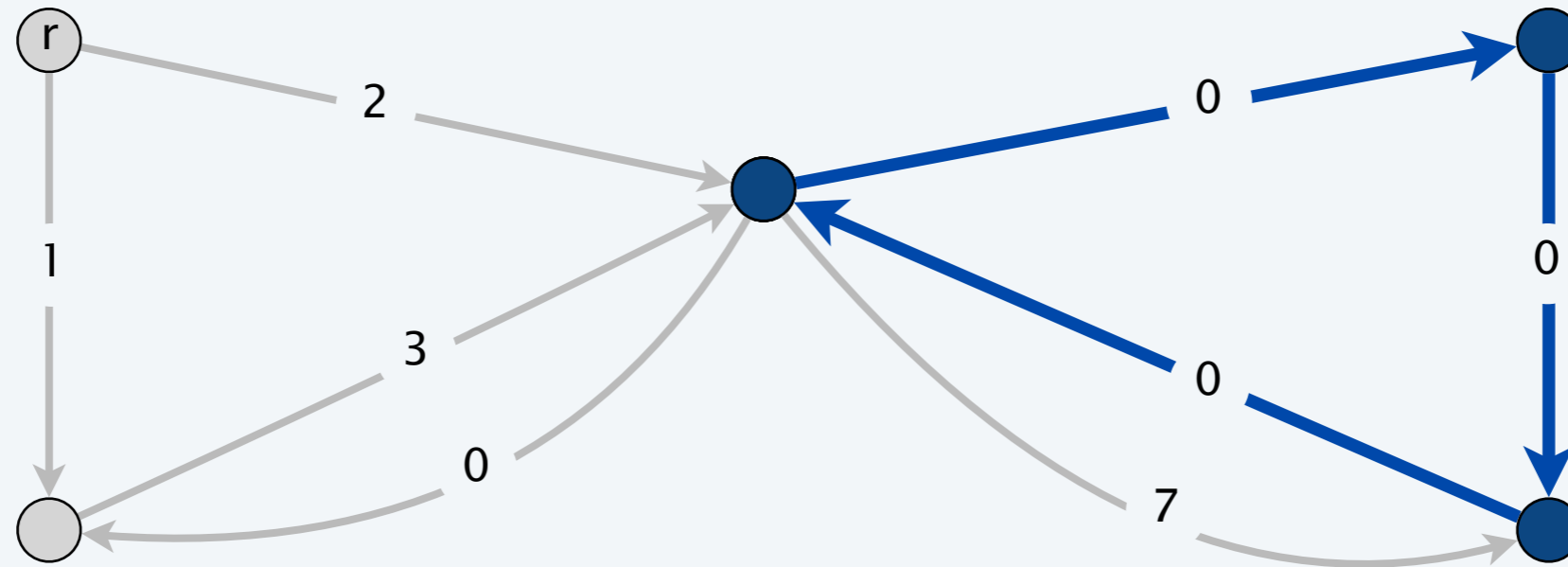
Edmonds branching algorithm demo

Phase 2: replace cost with reduced costs



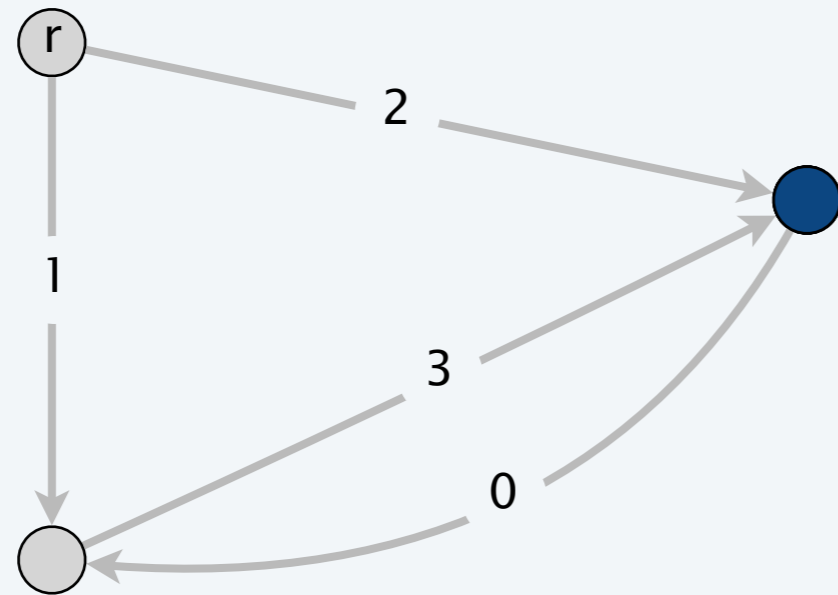
Edmonds branching algorithm demo

Phase 2: find 0-cost directed cycle and contract



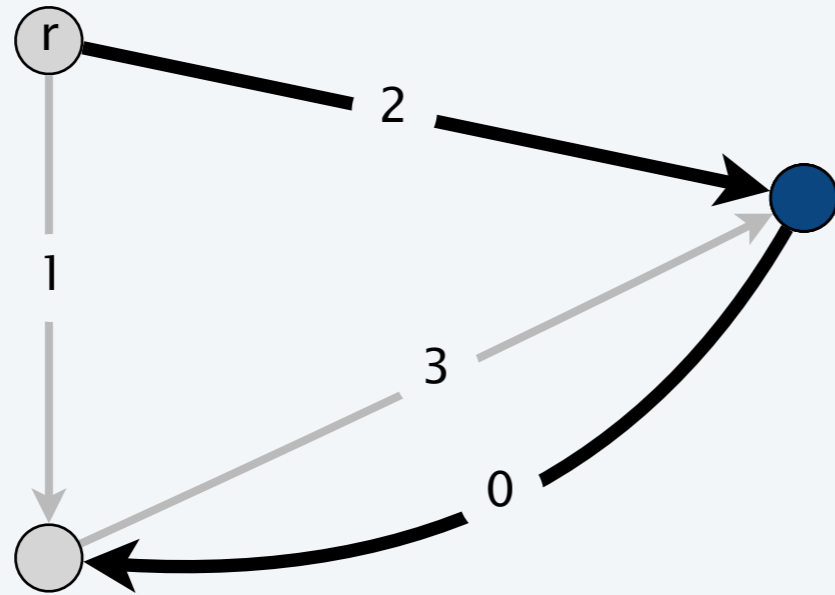
Edmonds branching algorithm demo

Phase 3: digraph G''



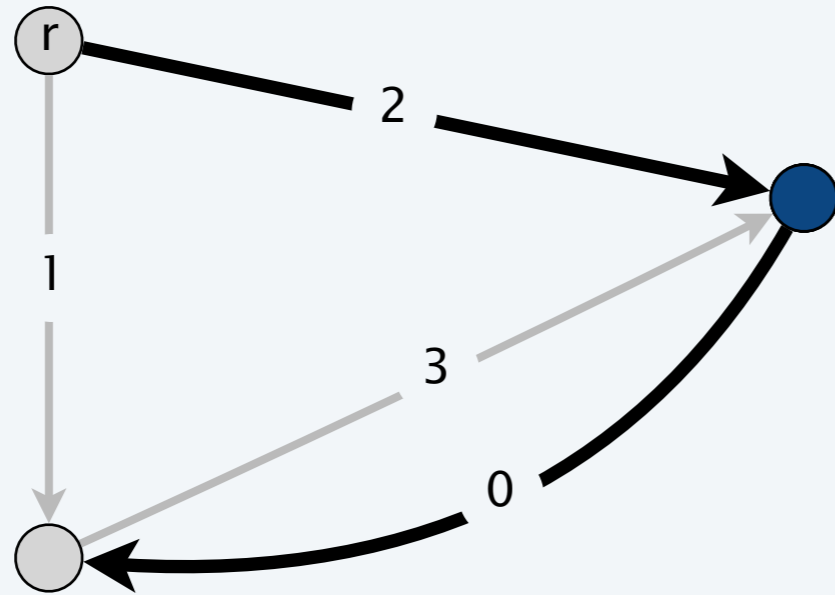
Edmonds branching algorithm demo

Phase 3: find cheapest edge entering each node



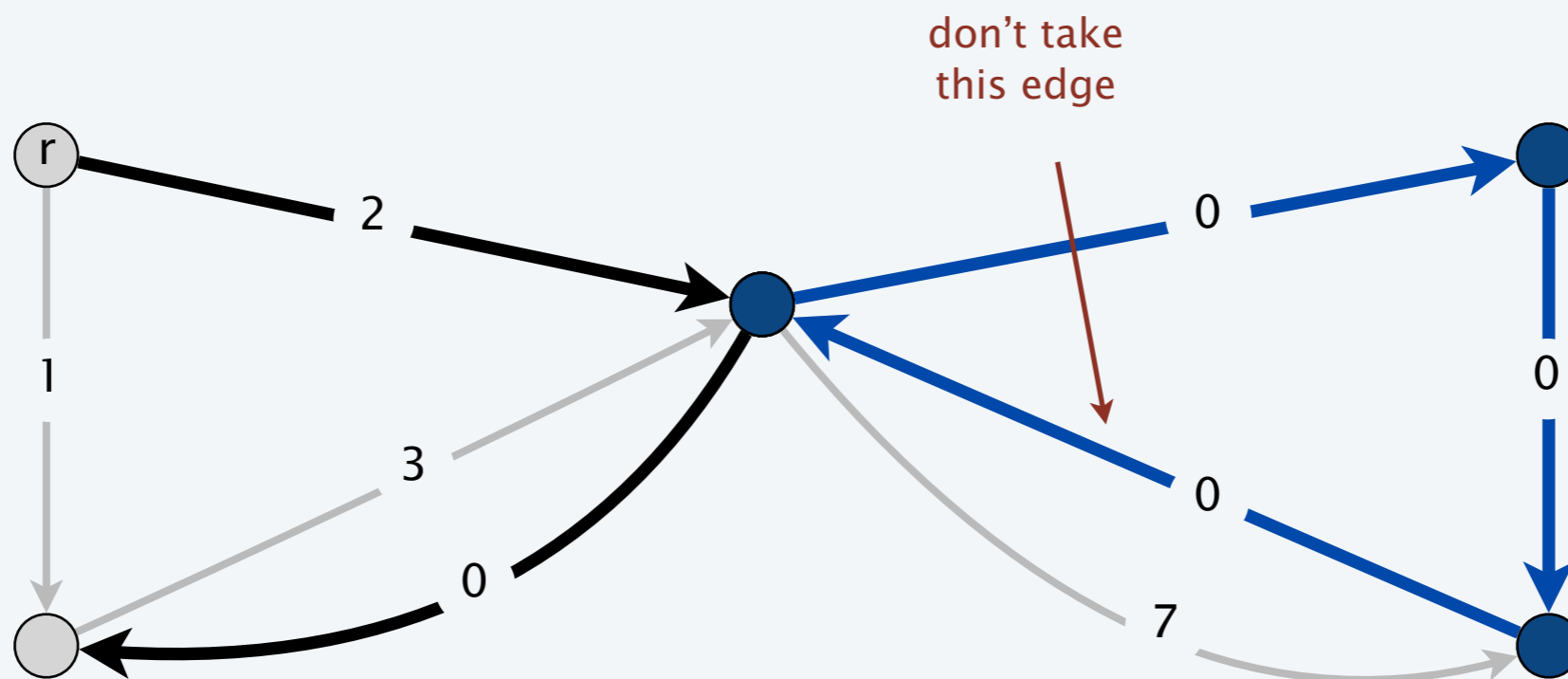
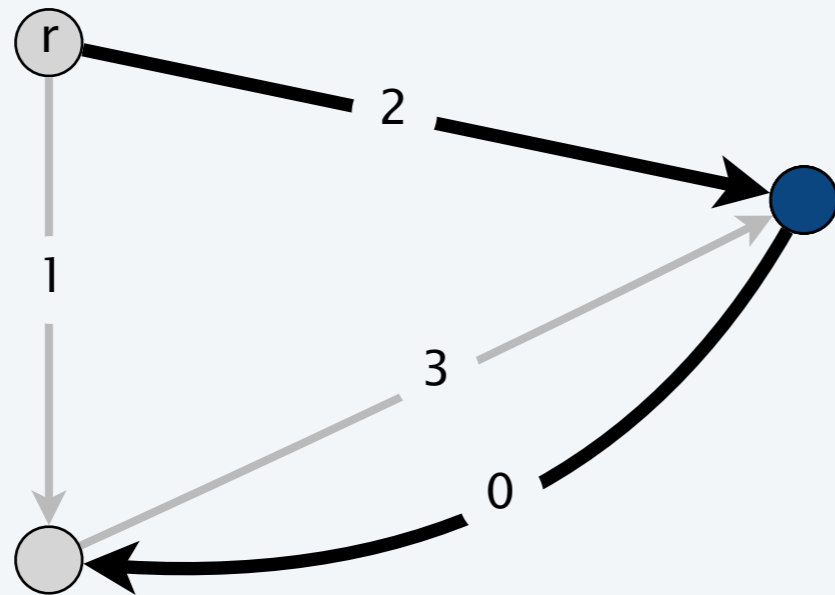
Edmonds branching algorithm demo

Phase 3: it's an arborescence!



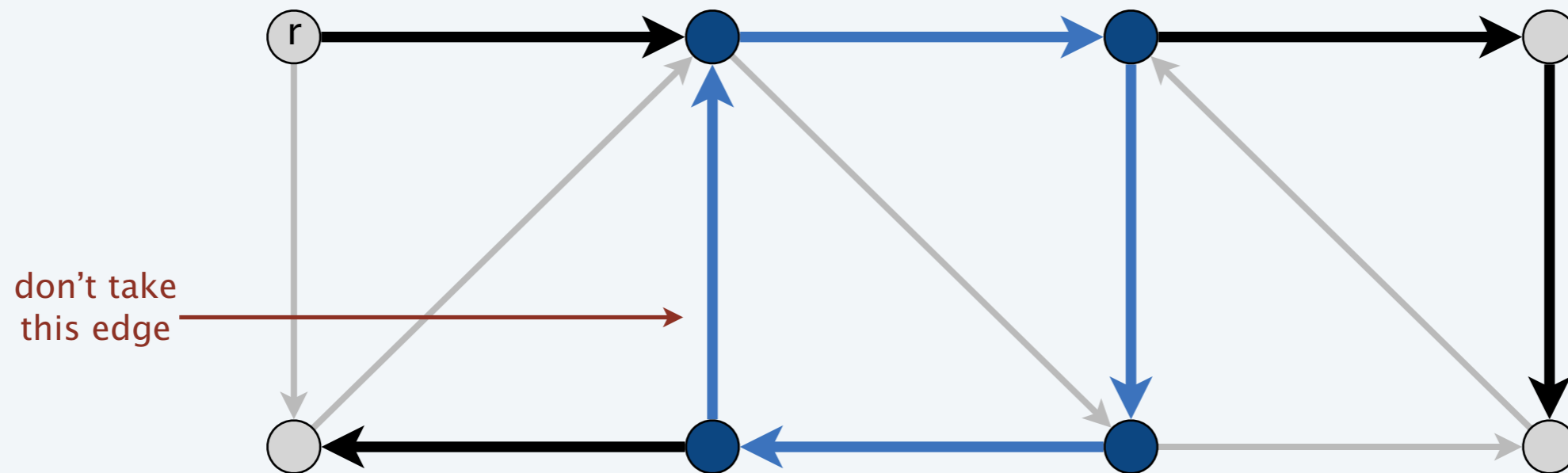
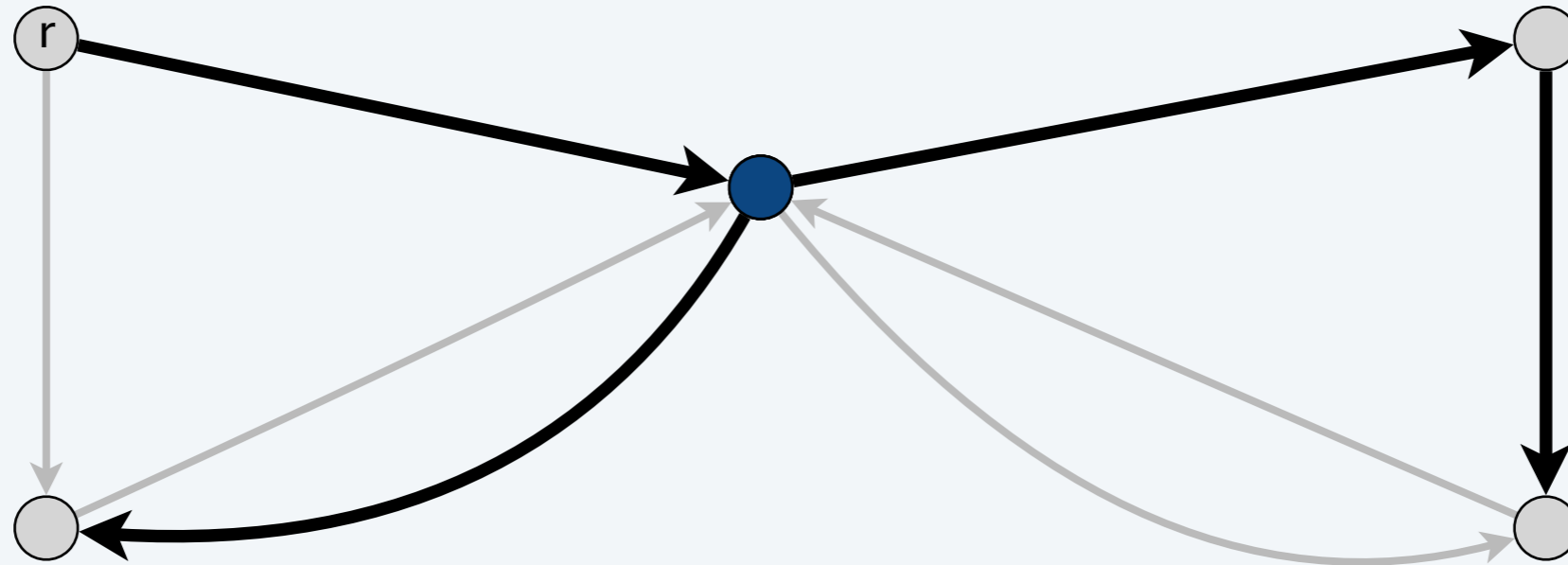
Edmonds branching algorithm demo

Phase 2': uncontract node and take all but one edge of cycle



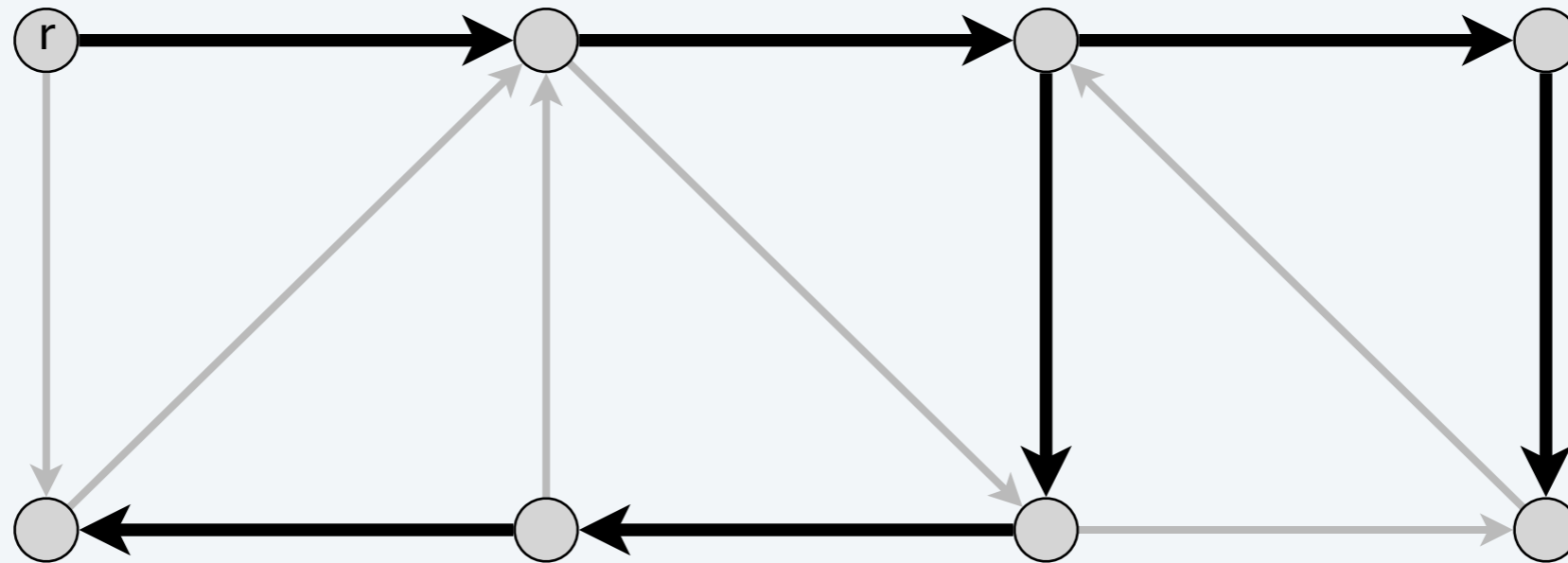
Edmonds branching algorithm demo

Phase 1': uncontract node and take all but one edge of cycle



Edmonds branching algorithm demo

stop: no more nodes to uncontract



Edmonds branching algorithm demo

min-cost arborescence

