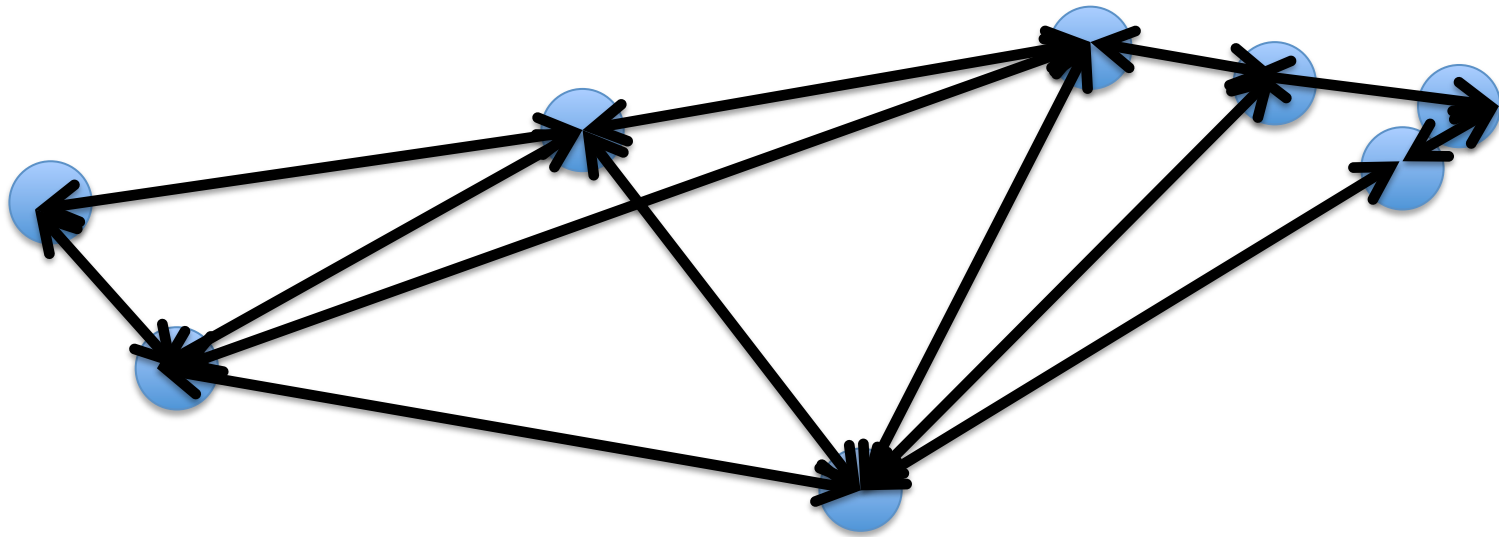


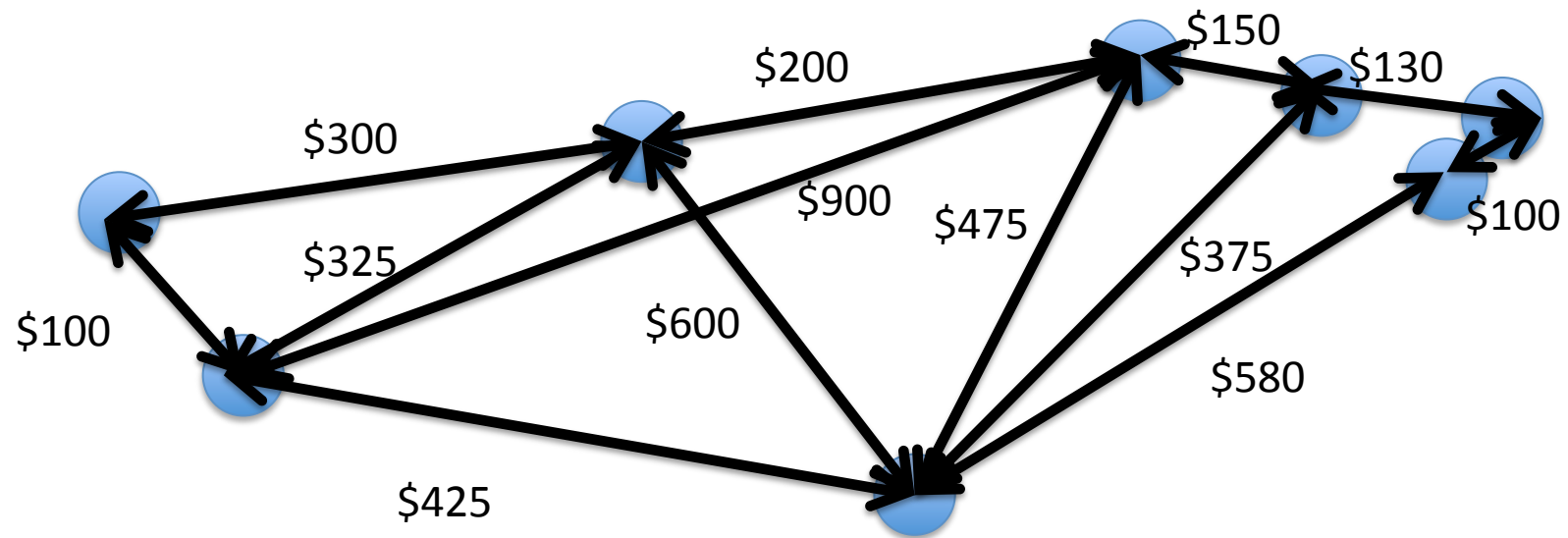
# Dealing with weighted graphs

- Our DFS and BFS algorithms find paths with fewest edges
- What if our edges are weighted (e.g. cost of each leg of flight, not just number of legs in flight)?
- Easy to modify DFS, by summing up weights rather than just length of path
- For BFS, first found solution may not be best, and one needs more sophisticated methods

# Graph abstraction



# Weighted graph abstraction



# Why graph optimization?

- Many problems easily expressed as a set of transitions between states of a system
  - Such problems naturally approached as a graph search
  - Example – travel through a physical network, like a road system
  - Example – planning the actions of an autonomous agent, like a robot
  - Example – finding a sequence of actions that convert the state of a physical system to a desired goal

# Why graph optimization?

- Depth first and breadth first search find a sequence of transitions that transform a system to a desired goal state
- These methods can find optimal solutions to wide range of problems described as set of objects with defined relationships or set of states of a system with defined transition actions