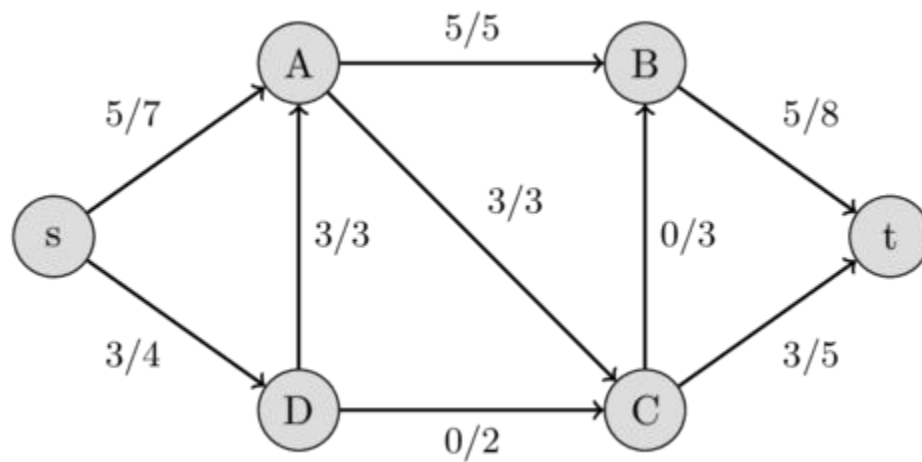# Welcome to CS 225

Lab Flow
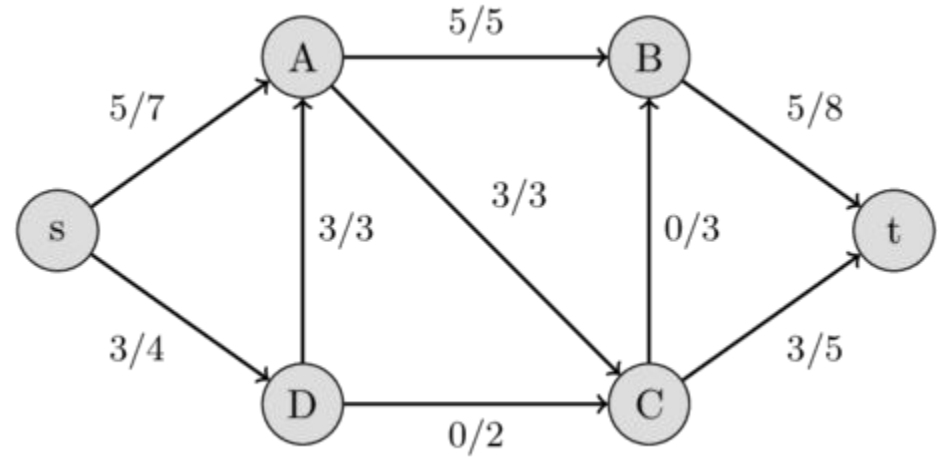
Network Flow

Definitions

Source - only has outgoing flow

Sink - only has incoming flow

Capacity - Total flow possible

Conservation of Flow - All flow into a node flows out

What is the overall flow of the network?

Ford Fulkerson Algorithm

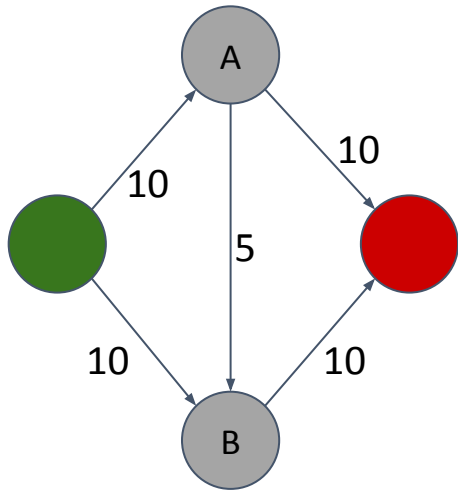Given: Network Graph with Source, Sink, and Capacities

While an augmented path exists:

1. Compute flow for the path
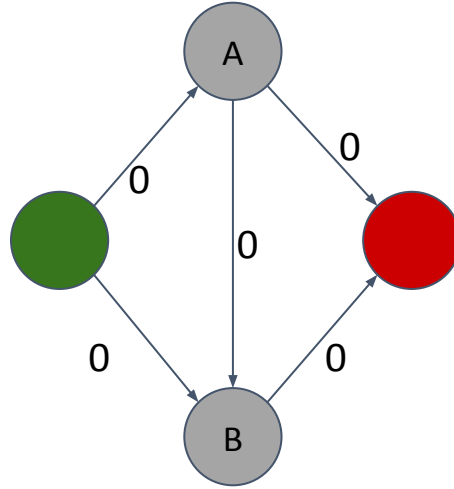2. Modify flow for each edge in the path

What you need to do:

1. Build Residual and Flow Graphs
2. Compute the flow for a path
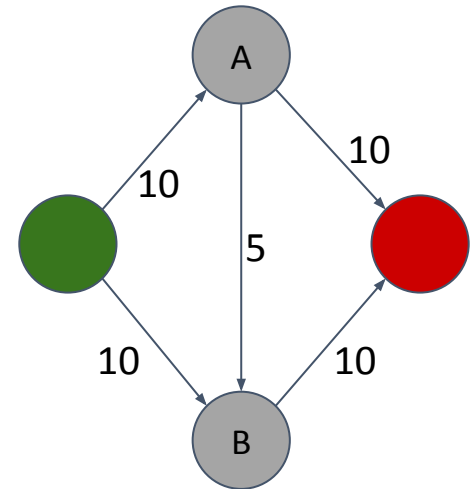3. Overall algorithm

Initialization of Residual and Flow Graphs
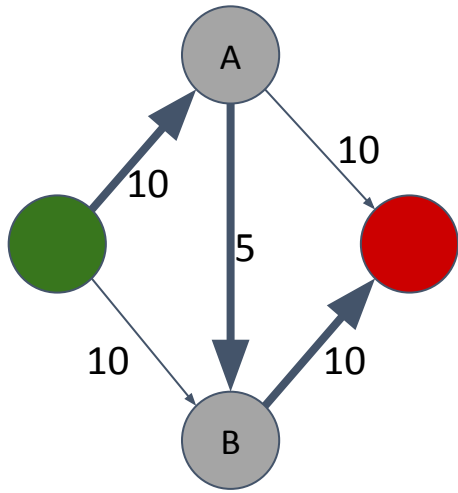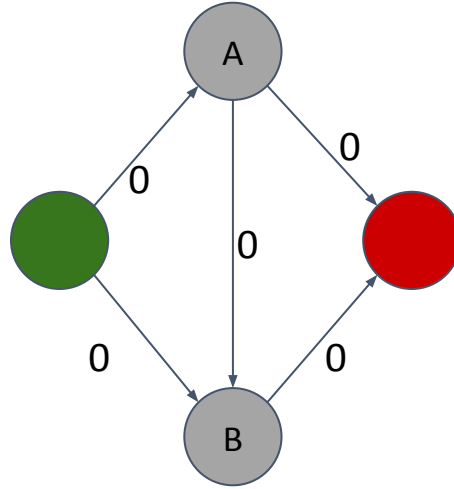

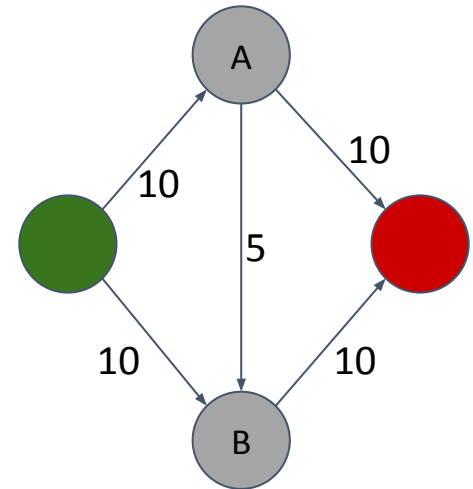Initial Graph w/ Capacities

Flow Graph

Residual Graph

What is the flow through the bolded path?

Initial Graph w/ Capacities

Flow Graph

Residual Graph

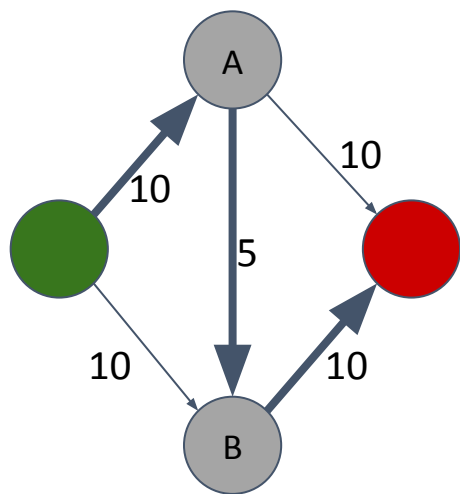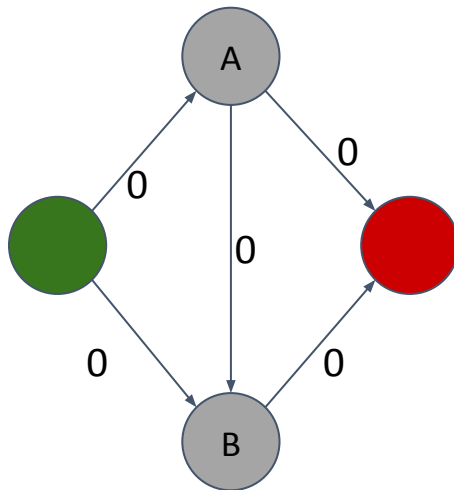# What is the flow through the bolded path?

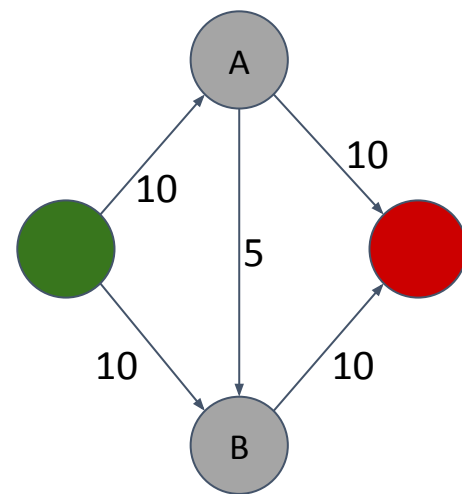

Initial Graph w/ Capacities

Flow Graph

Residual Graph

Minimum edge weight in the path
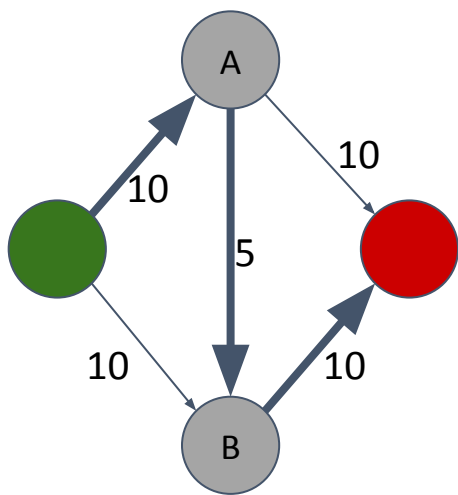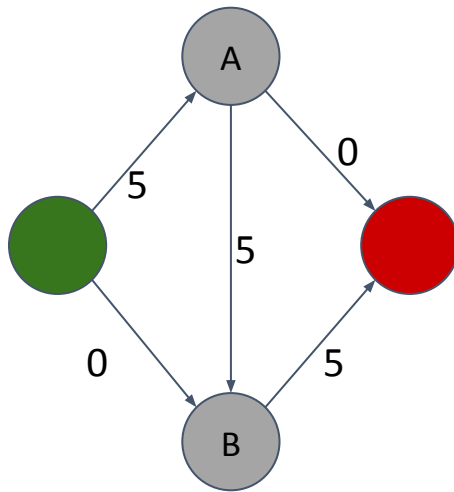
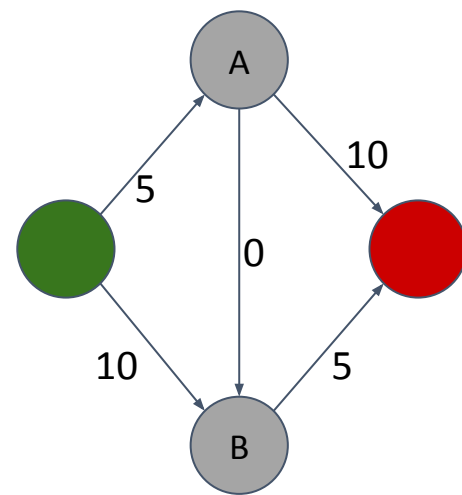How do I update flow and residual?

Updated Flow and Residual
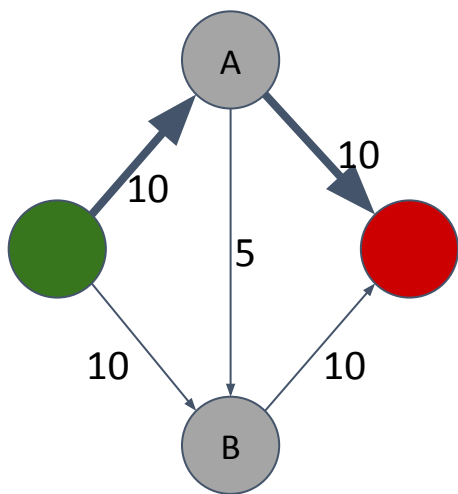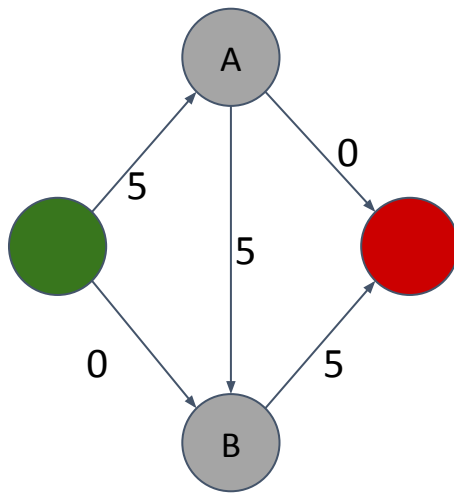

Initial Graph w/ Capacities

Flow Graph

Residual Graph

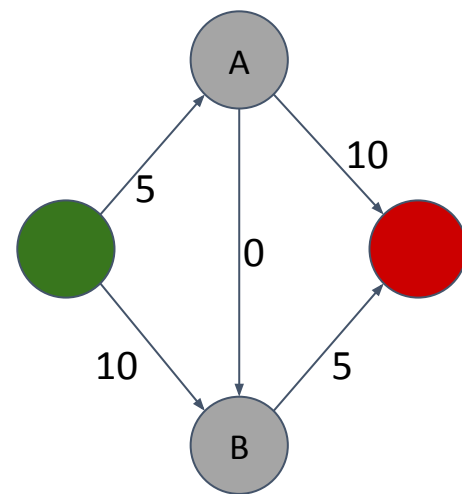What's another possible augmented path?

New Augmented Path
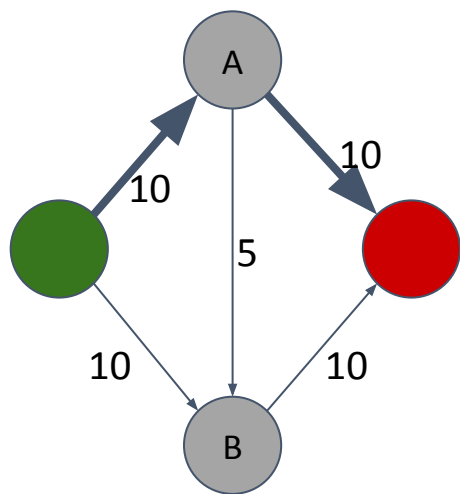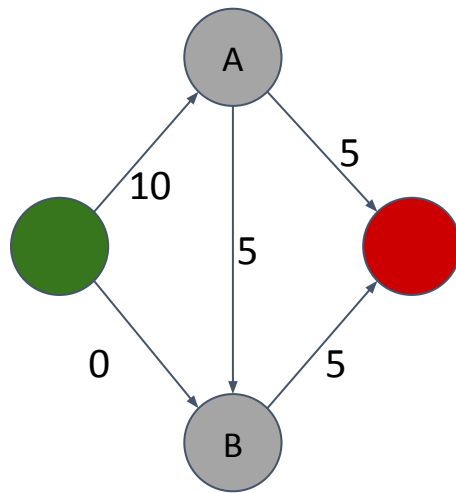

Initial Graph w/ Capacities
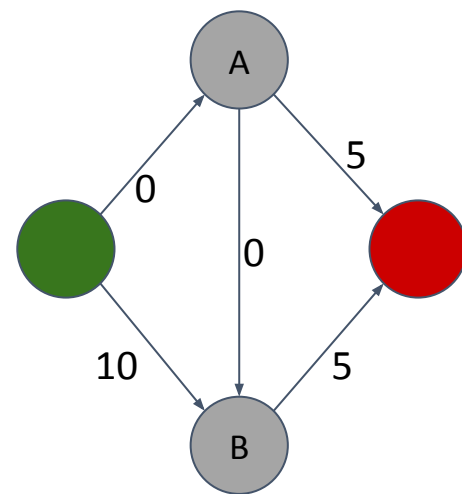
Flow Graph

Residual Graph

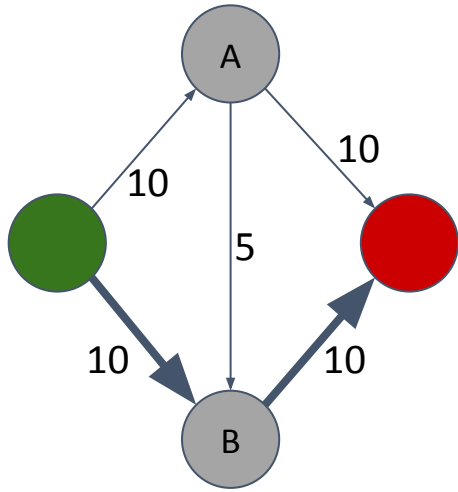# Updated Flow and Residual
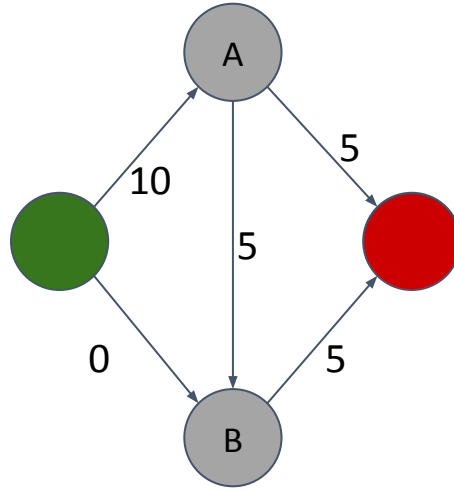

Initial Graph w/ Capacities

Flow Graph

Residual Graph
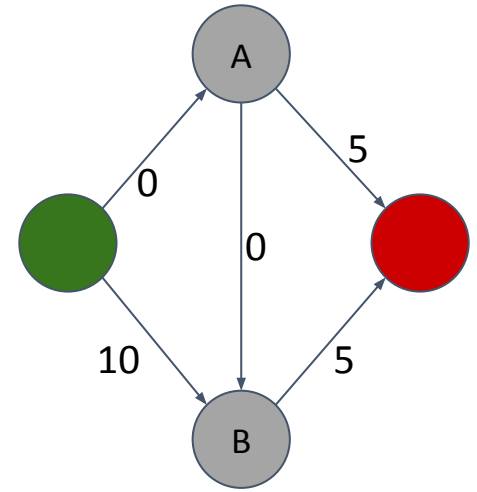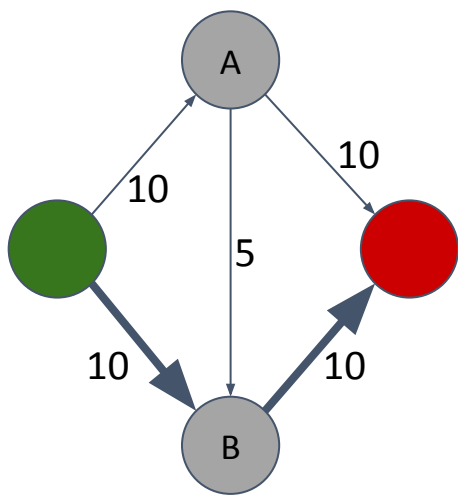
New Augmented Path

Initial Graph w/ Capacities
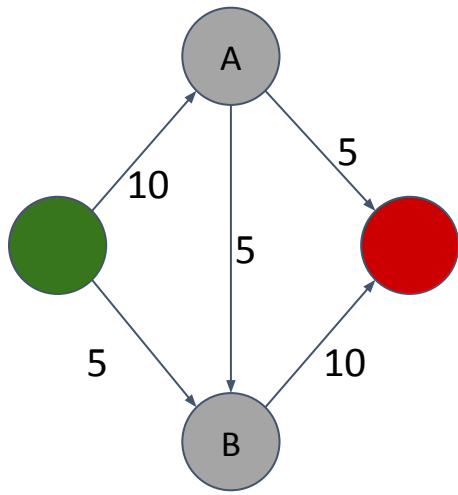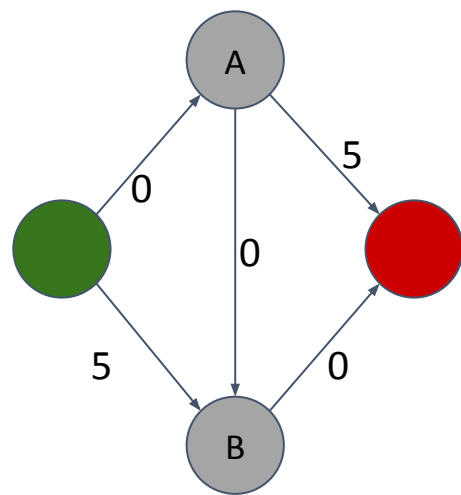
Flow Graph

Residual Graph

Updated Flow and Residual
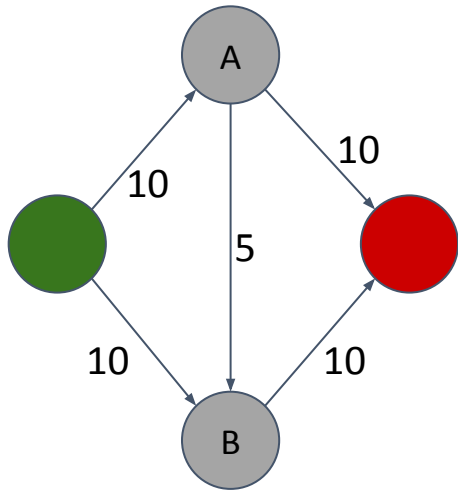

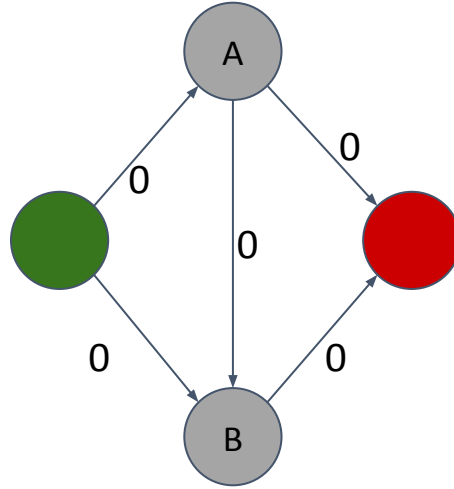Initial Graph w/ Capacities

Flow Graph

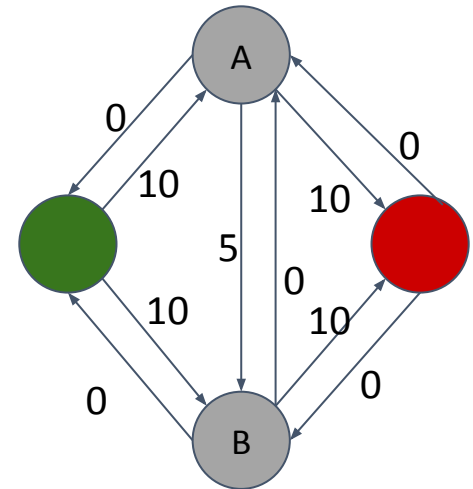Residual Graph

Algorithm says you're done! Is this correct?

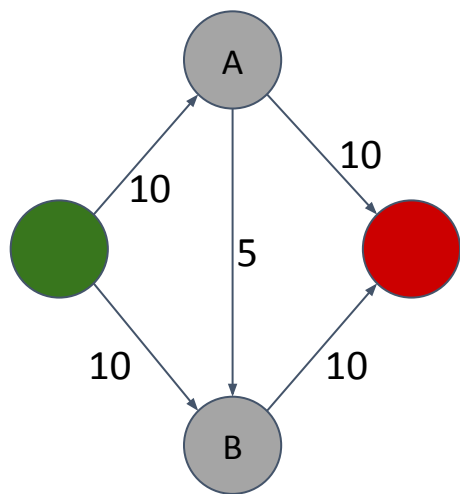# Fixing the ordering problem with reverse edges
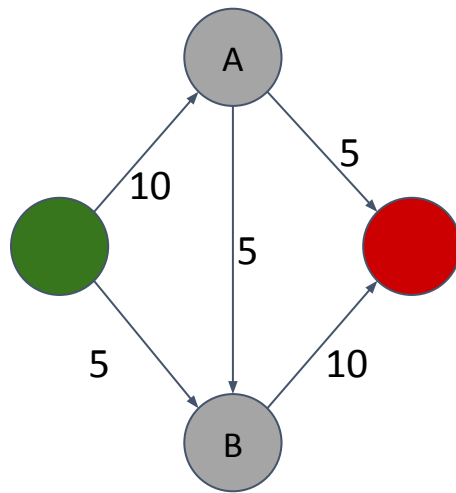

Initial Graph w/ Capacities
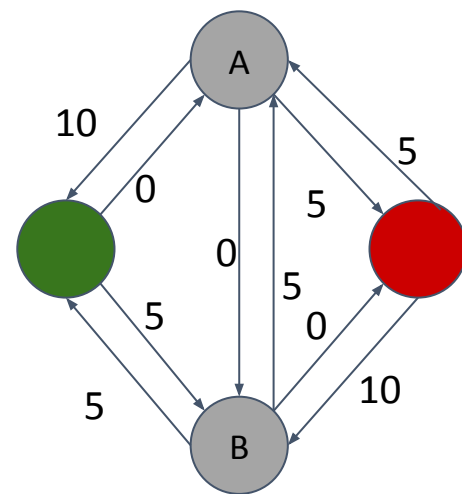
Flow Graph

Residual Graph

How does this fix the problem?
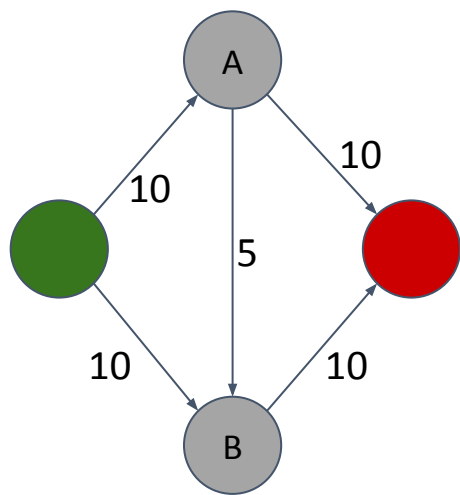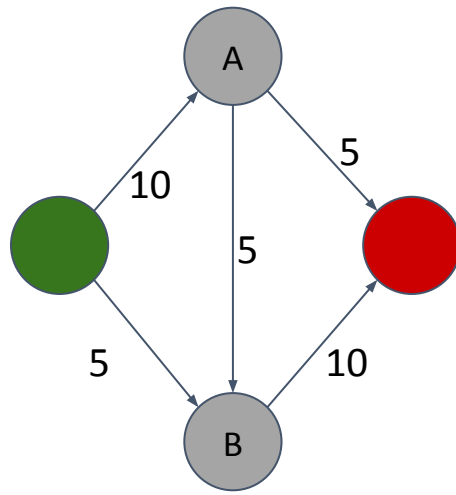

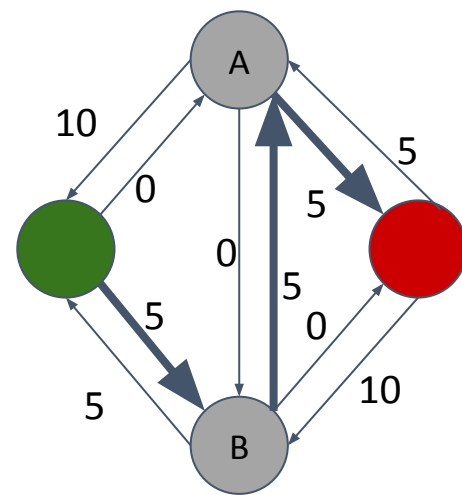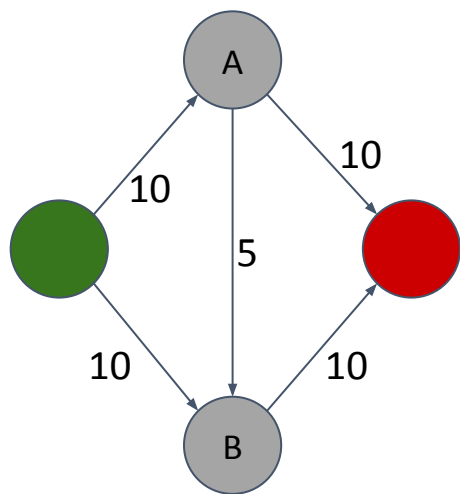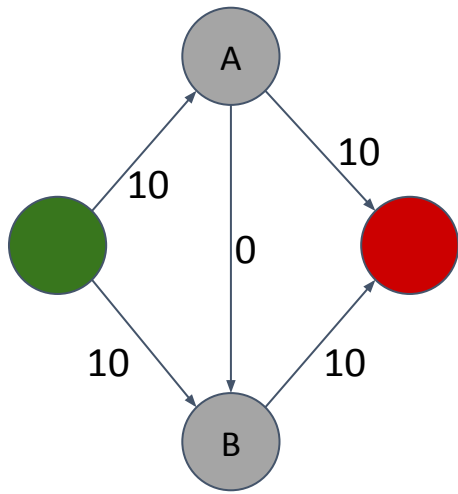Initial Graph w/ Capacities

Flow Graph

Residual Graph

How does this fix the problem?

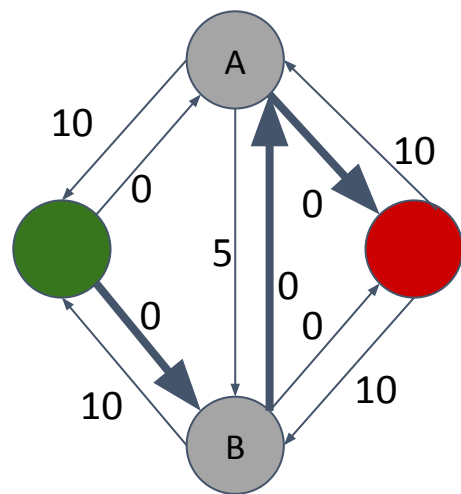Initial Graph w/ Capacities

Flow Graph

Residual Graph

Final Graph State

Initial Graph w/ Capacities

Flow Graph

Residual Graph

Ford Fulkerson Algorithm

Given: Network Graph with Source, Sink, and Capacities

While an augmented path exists:

1. Compute flow for the path
2. Modify flow for each edge in the path

What you need to do:

1. Build Residual and Flow Graphs
2. Compute the flow for a path
3. Overall algorithm