

# *Algorithm Design and Analysis*

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**CSE  
565**

## **LECTURES 25-26**

- 2-connectivity
- Midterm discussion

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# Last Time: Ford-Fulkerson

- Find **max  $s-t$  flow** & **min  $s-t$  cut** in  $O(mnC)$  time
  - All capacities are integers  $\leq C$
  - (We will discuss how to remove this assumption)
- **Duality**: Max flow value = min cut capacity
- **Integrality**: if capacities are integers, then FF algorithm produces an **integral** max flow

- Let  $G$  be a directed, unweighted graph.

**Fact:** (A) Removing any single edge leaves  $G$  strongly connected **iff**

(B) For all vertices  $u, v$ , there exist two edge-disjoint paths from  $u$  to  $v$ .

Can we express these via min-cut max-flow language?

# Going over midterm

## General comments

- Read and chose problems carefully, write well
- When studying:
  - identify what you don't understand
  - test yourself via (a) rederiving algorithms, proofs from class and (b) exercises in book.
  - Read alternative explanations (e.g. Cormen)

# More about midterm

- Write false statements → lose points
  - bad for brain
- Proofs: first convince yourself
  - write to convince a skeptical peer
  - watch out for proofs “by example” (not general!)
  - Remind me to send links on writing proofs
- “if and only if” means “A implies B” and “B implies A”
- Greedy algorithms: show local optimum is global