

Show **ALL** work for credit; be neat; and use only **ONE** side of each page of paper.

1. Network True or False.

- A. If $F(\mathcal{S}, \mathcal{T}) - F(\mathcal{T}, \mathcal{S}) = \text{capacity}(\mathcal{S}, \mathcal{T})$, then F is a maximal flow.
- B. If $F(\mathcal{T}, \mathcal{S}) = 0$ and $(\mathcal{S}, \mathcal{T})$ is minimal cut, then F is a maximal flow.
- C. A cut can be minimal for one flow, and not minimal for another flow.
- D. If ab is an unsaturated edge with non-zero flow and $(\mathcal{S}, \mathcal{T})$ is a minimal cut, then either both vertices are in \mathcal{S} or both vertices are in \mathcal{T} .
- E. If $|F| = 0$, then every edge has zero flow.

2. For the transport networks below:

- A. Which have a unique maximal flow?
- B. Which have a unique minimal cut?
- C. Which have the property that every non-zero integer-valued flow is maximal?
- D. Which have the property that every cut is minimal?

