

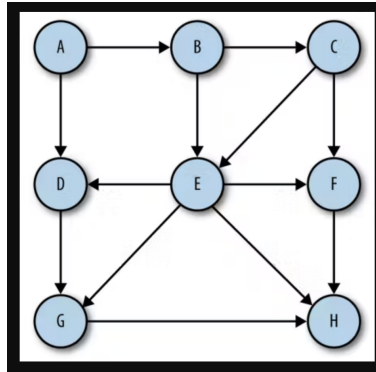
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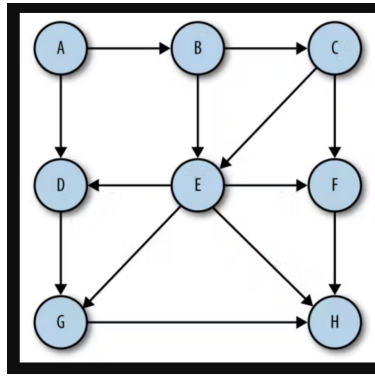
LARSON—MATH 556—CLASSROOM WORKSHEET 28
Menger and Tutte Theorems!

Review

- What is the Ford-Fulkerson Theorem?



1. What is a *directed path* from point x to point y in a directed graph?
2. Find the maximum number of directed paths you can find from point B to point H , which are *line disjoint* (that is, no two directed paths share a common line).
3. Find the minimum number of directed lines you need to remove in order to destroy all $B - H$ directed paths.

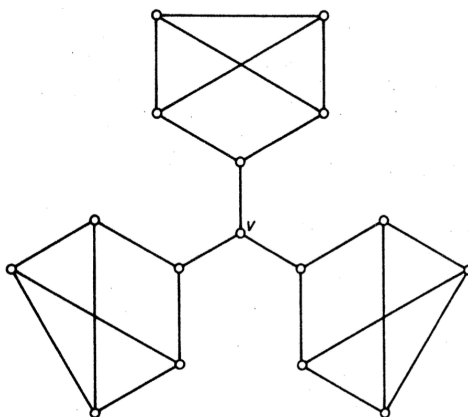


4. (**Menger's Theorem:**) Let x, y be points in a directed graph D . The maximum number of line-disjoint directed paths from point x to point y equals the minimum number of directed lines you need to remove in order to destroy all $x - y$ directed paths.

How can you apply the Max Flow-Min Cut Theorem in order to prove Menger's Theorem?

5. Let G be a graph. What is $c_o(G)$?

6. Let G be a graph and $X \subset V(G)$ so that $c_o(G - X) > |X|$, Why can't G have a perfect matching?



7. Explain why this graph does not have a perfect matching?

8. (**Tutte's Theorem**) A graph G has a perfect matching if and only if $c_o(G - X) \leq |X|$ for every $X \subset V(G)$.

What theorem that we've learned resembles this theorem?