

CS330HW8

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Problem 1A

One augmenting path is $(\mathbf{3}, \mathbf{3}), (\mathbf{2}, \mathbf{3}), (\mathbf{2}, \mathbf{1}), (\mathbf{1}, \mathbf{1}), (\mathbf{1}, \mathbf{4})$, where (a, b) indicates an edge from a on the left to b on the right*. This is an augmenting path because it goes from unmatched node 3 on the left to unmatched node 4 on the right - alternating between matched and unmatched edges.

Another augmenting path is $(\mathbf{4}, \mathbf{2})$. This augmenting path connected unmatched node 4 on the left of unmatched node 2 on the right directly through an unmatched edge.

*Note: this note on notation is important because it doesn't indicate the direction of the path edge.

Problem 1B

An optimal matching in which all vertices are matched exists and is given below.

Matched edges:

$(\mathbf{1}, \mathbf{4}), (\mathbf{2}, \mathbf{1}), (\mathbf{3}, \mathbf{3}), (\mathbf{4}, \mathbf{2})$