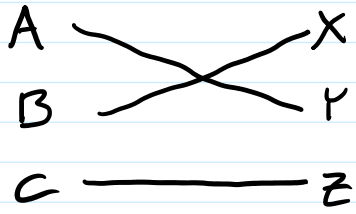
Stable Matching

Problem: Given the preferences of n machinists and n welders, find a good matching of them.

Machinist	Preferences
A	X, Y, Z
B	X, Z, Y
C	Z, X, Y

Welder	Preferences
X	A, B, C
Y	A, C, B
Z	A, B, C



1st	2nd	3rd
B, C, Y	A, X	Z

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Y	A, C, B
Z	A, B, C

A —— X

B —— Y

C —— Z

1st	2nd	3rd
A, C, X		B, Y, Z

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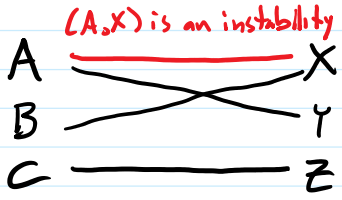
Y	A, C, B
Z	A, B, C

$\{(A,Y),(B,X),(C,Z)\}$



1st	2nd	3rd
B, C, Y	A, X	Z

Matching: a subset of $M \times W$ s.t. each $m \in M$ appears in ≤ 1 pair and each $w \in W$ appears in ≤ 1 pair
Perfect Matching: a subset of $M \times W$ s.t. each $m \in M$ appears in 1 pair and each $w \in W$ appears in 1 pair

Instability (with respect to perfect matching S): a pair (m, w') s.t. m prefers w' to the w s.t. $(m,w) \in S$ and w' prefers m to the m' s.t. $(m', w') \in S$

Stable Matching: a perfect matching S s.t. there are no instabilities w.r.t. S

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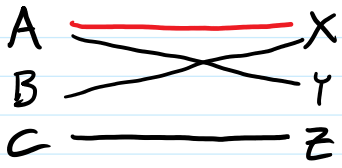

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B	X, Z, Y
C	Z, X, Y

Welder	Preferences
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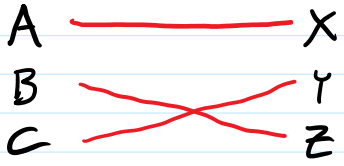
Y	A, C, B
Z	A, B, C

$S = \{(A, X), (B, Z), (C, Y)\}$



Potential Instabilities ($\notin S$)
~~(A, Y)~~ ~~(A, Z)~~
~~(B, X)~~ ~~(B, Y)~~
~~(C, X)~~ ~~(C, Z)~~

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