Cognates

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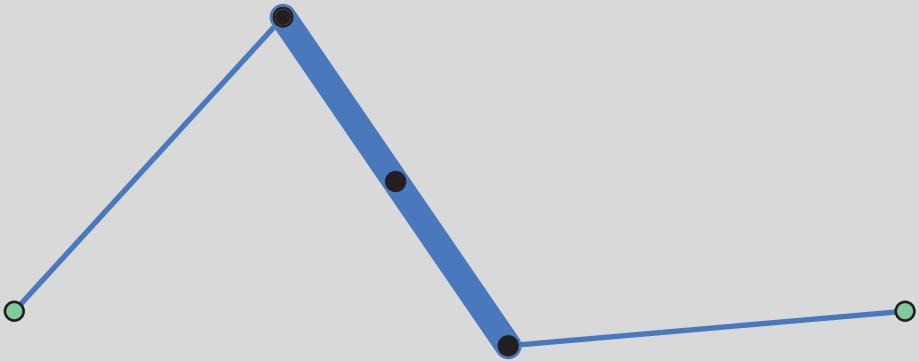
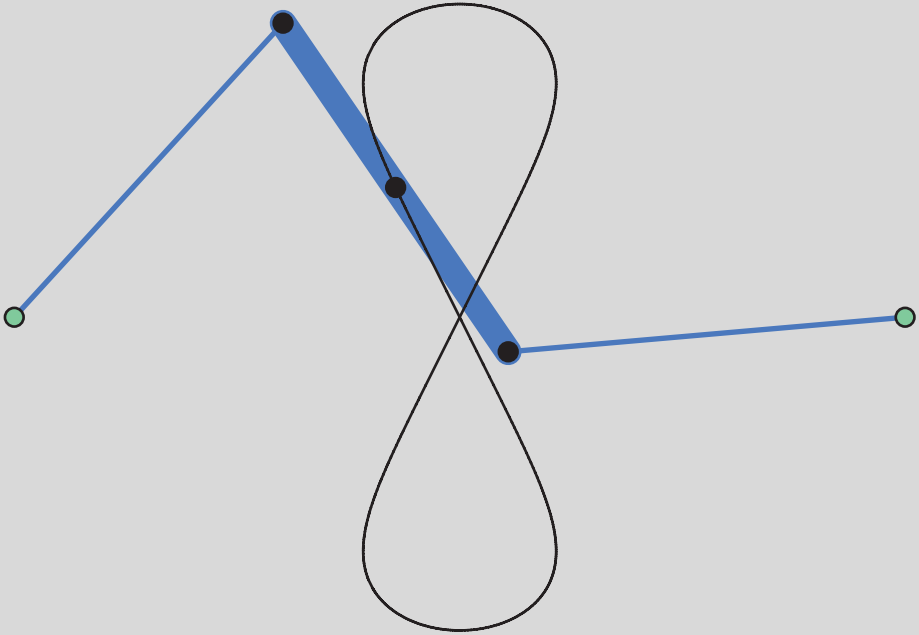
1. Simple Mechanisms

Mechanism: A bar and joint framework (in the plane)
Some vertices have been pinned to the ground,
It has one degree of freedom.

Example: Watt Mechanism



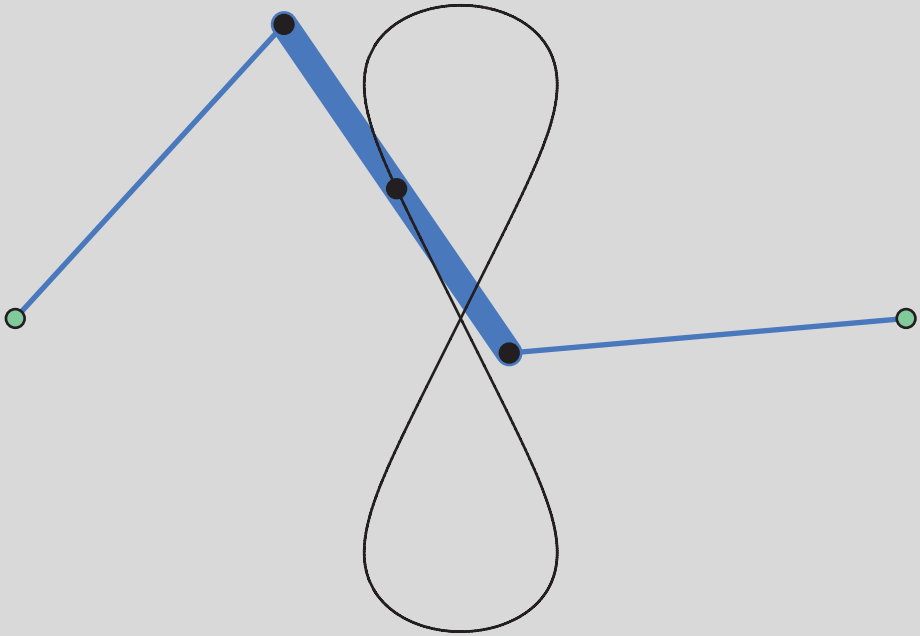
Example: Watt Mechanism



Traced curve: a projection of the configuration space.

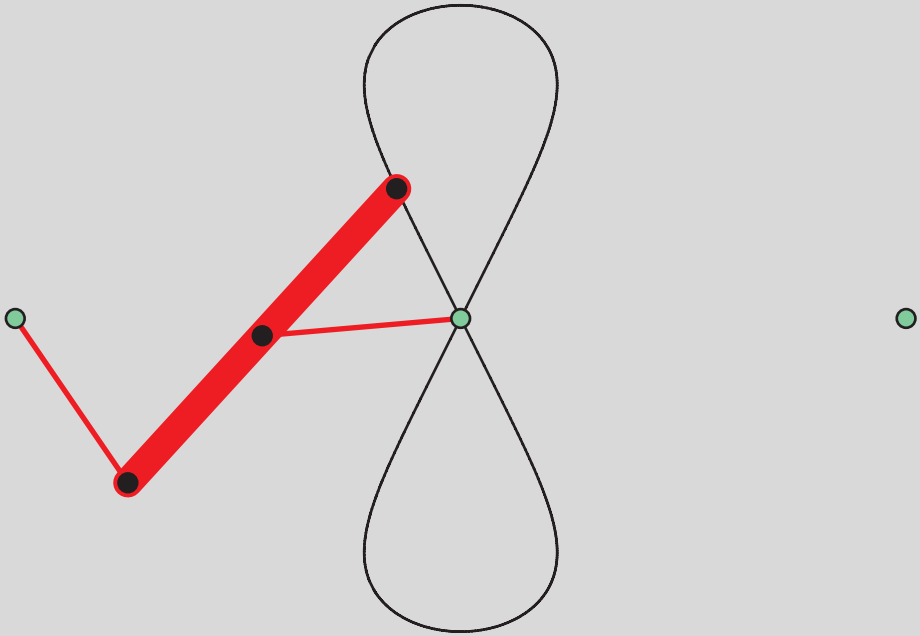
$$(M, p)$$

2. Cognate Pairs



Cognate Mechanisms: A pair of mechanisms and tracing points such that the traced curves are locally identical.

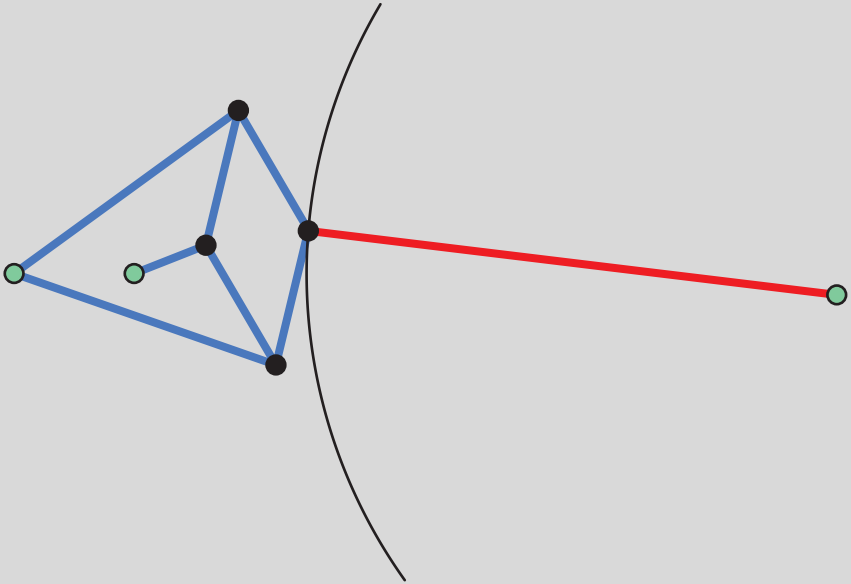
$$[(M, p), (M', p')]$$



Cognate Mechanisms: A pair of mechanisms and tracing points such that the traced curves are locally identical.

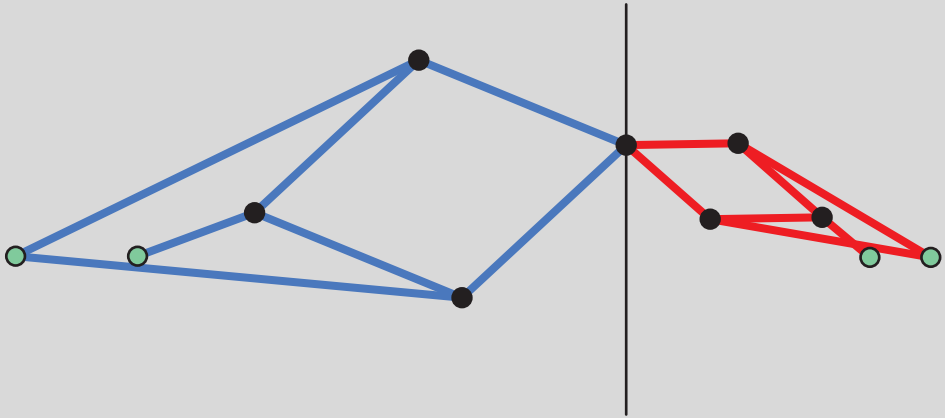
$$[(M, p), (M', p')]$$

Example: Simple Compass is cognate to Peaucellier's "Compound Compass"

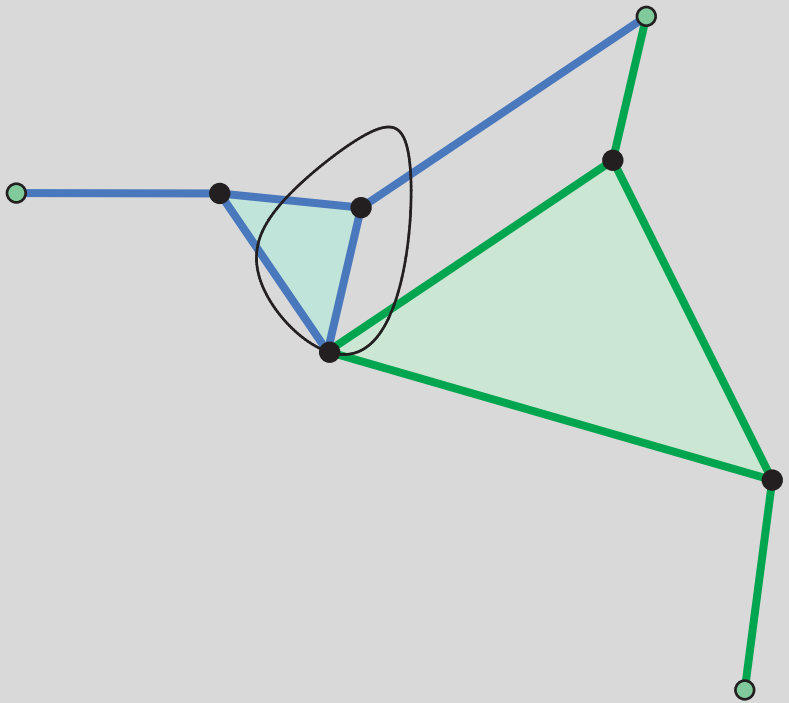


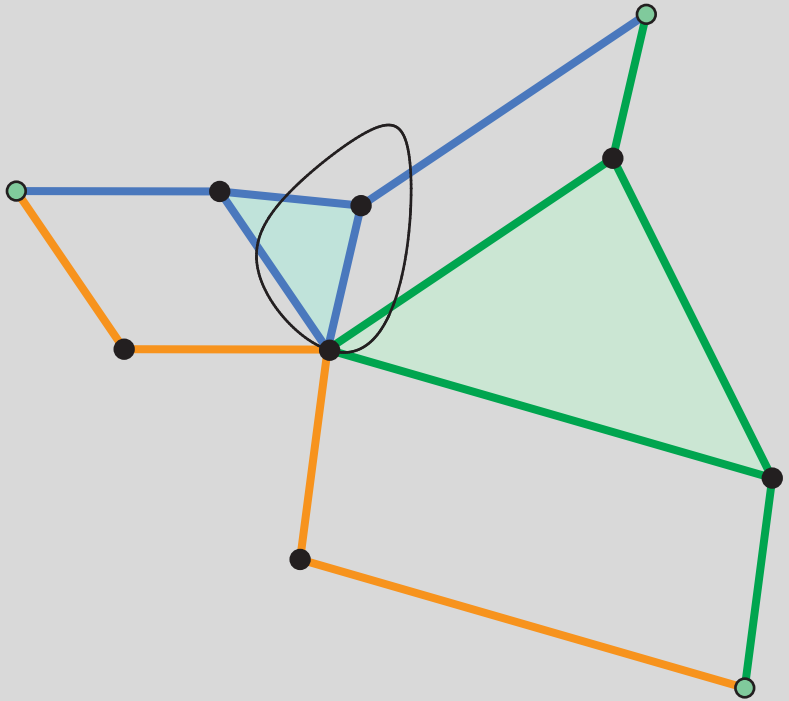
The *Coupler Curve* is a circle.

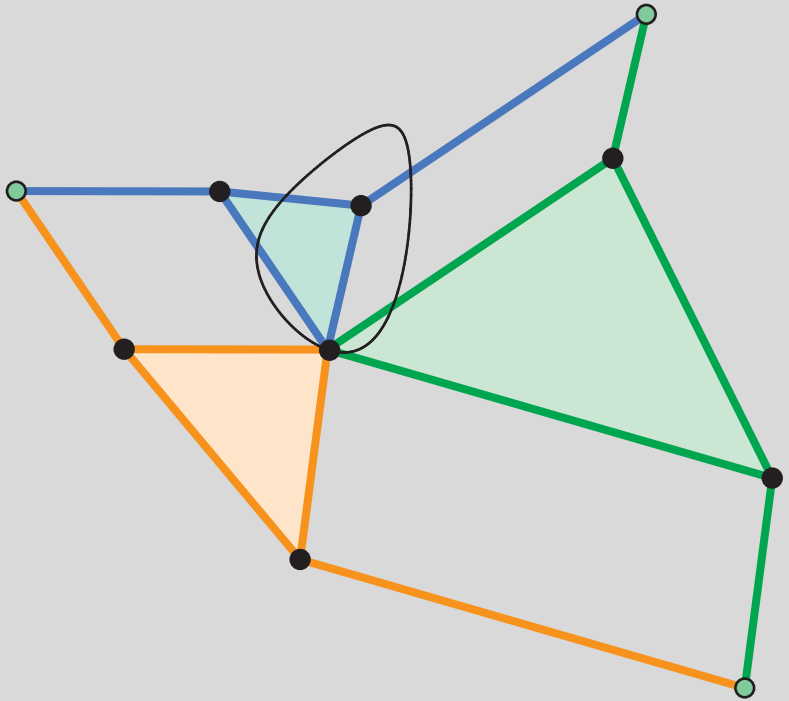
Example: Peaucellier's "Compound Compass" is cognate with itself

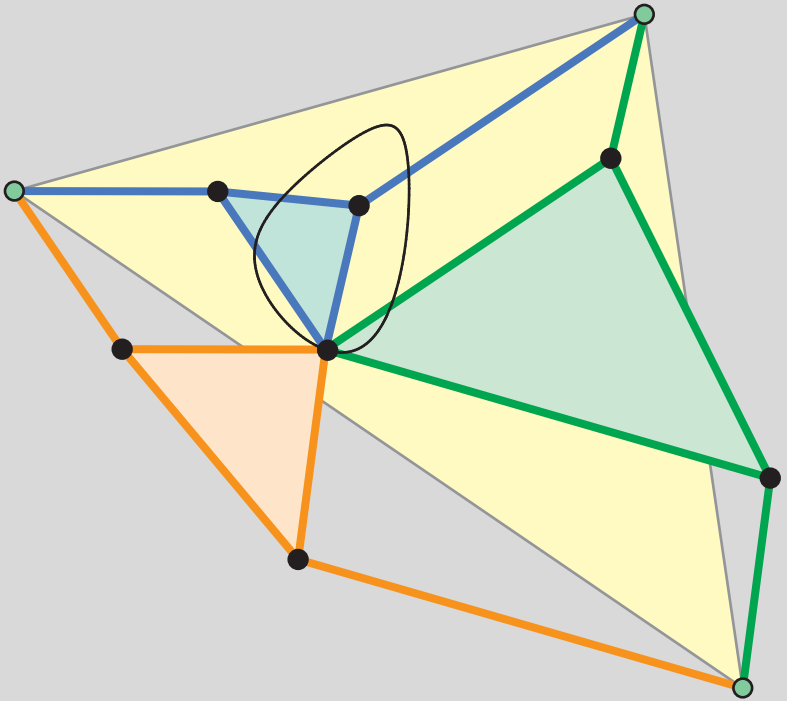


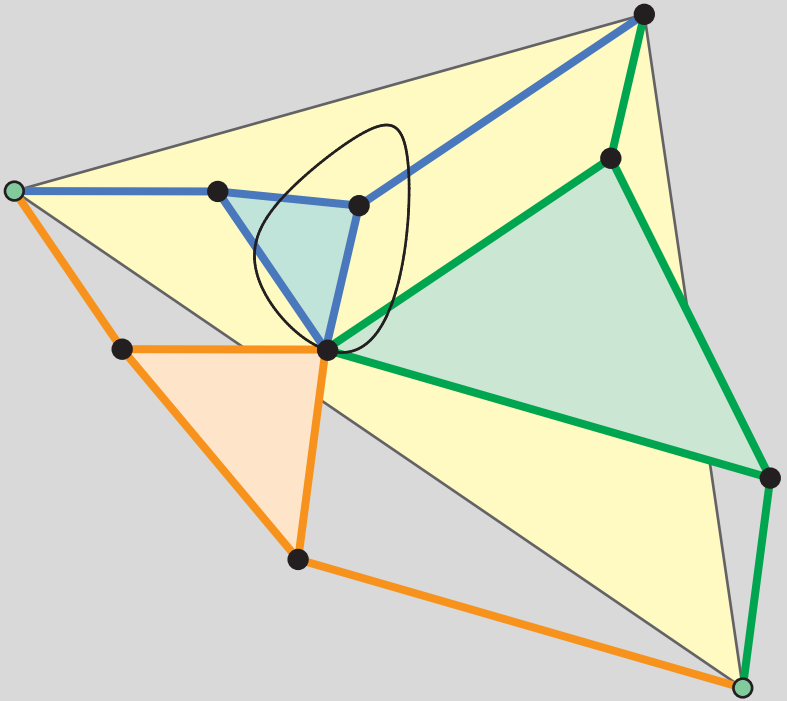
The *Coupler Curve* is a straight line.

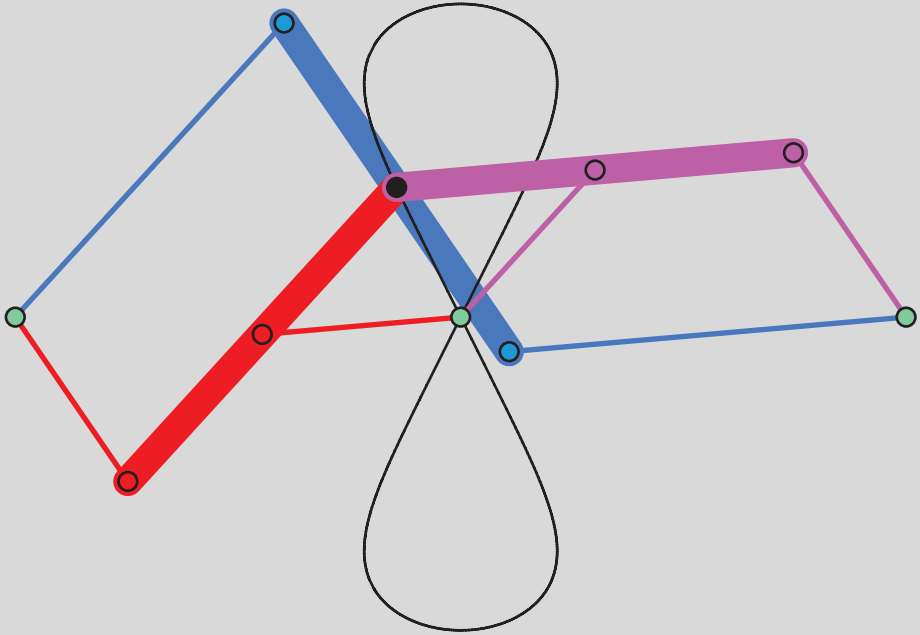






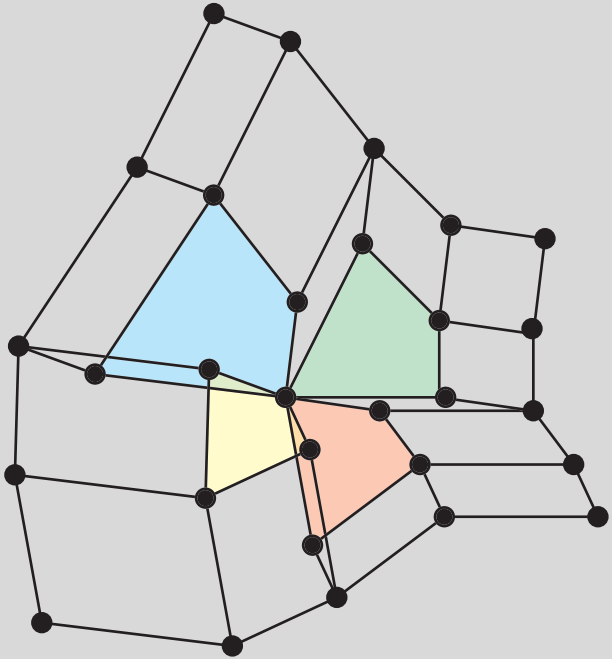






3. Generalized Cognate

A structure with three degrees of freedom.



Home Page
Title Page
◀◀ ▶▶
◀ ▶
Page 16 of 18
Go Back
Full Screen
Close
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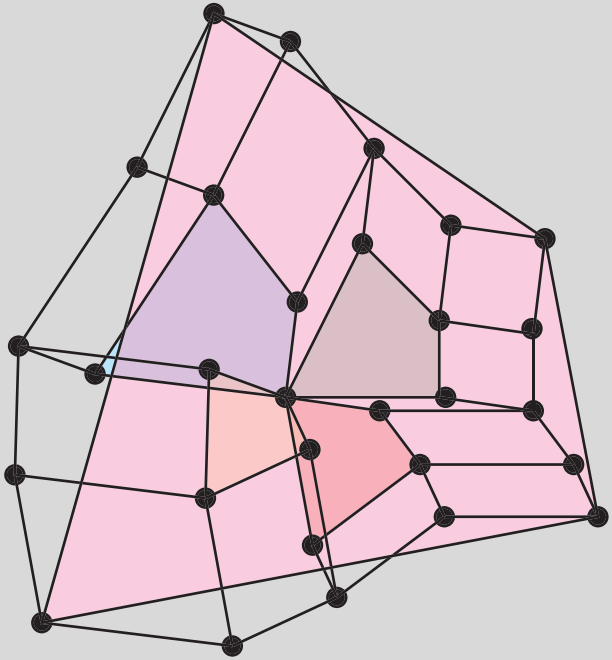
Four exterior joints form a similar figure to the quadrilateral bodies.

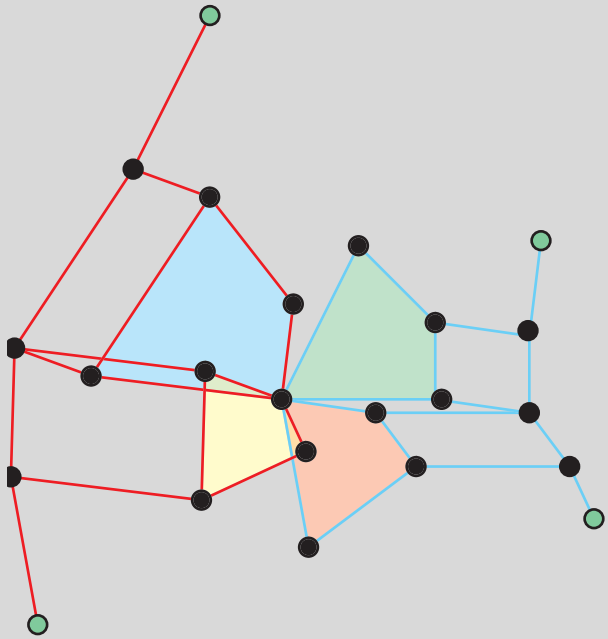
Pinning any two is equivalent pinning all four.

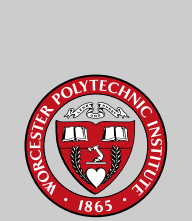
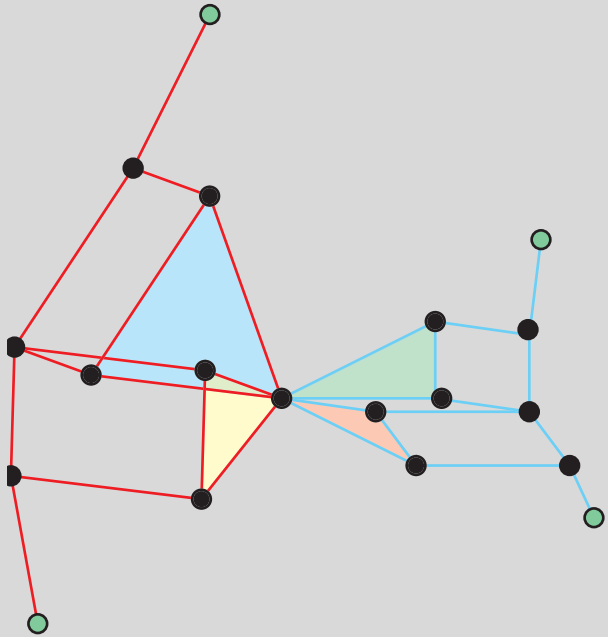
Pinned structure has two degrees of freedom.



Home Page
Title Page
◀◀ ▶▶
◀ ▶
Page 17 of 18
Go Back
Full Screen
Close
Quit

We can split into two cognate degree of freedom two structures.





A version with disjoint areas of action.