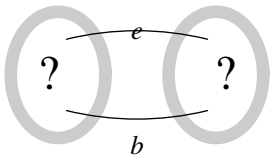
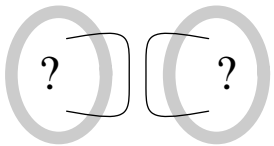
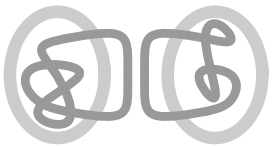


We know that G can be drawn as two components connected only by e and b.



We can cut G up into two smaller graphs, each "short−circuiting" the other component.



If only the smaller graphs, but not G, have switch cycles, then they must be using the short−circuits.

But then we can reconnect the components and see that G has a switch cycle too.