A special case of completion invariance for the $c_2$ invariant of a graph

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Abstract. The $c_2$ invariant is an arithmetic graph invariant defined by Schnetz. It is useful for understanding Feynman periods. Brown and Schnetz conjectured that the $c_2$ invariant has a particular symmetry known as completion invariance. This paper will prove completion invariance of the $c_2$ invariant in the case that we are over the field with 2 elements and the completed graph has an odd number of vertices. The methods involve enumerating certain edge bipartitions of graphs; two different constructions are needed.