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A Simplified Proof for Duality of the Euclidean Property in Oriented Matroids

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It is a well-known fact that the dual of a Euclidean oriented matroid program is Euclidean. The original proof, mimicking the Simplex Algorithm, uses pivot steps and tableaux to show that there is a correspondence between non-Euclidean cycles in the original program and non-Euclidean cycles in the dual. I will simplify this proof. In my proof I will work with cycles in a pseudo-sphere representation of the oriented matroid together with labels on their vertices. Such a cycle will be called a labeled cycle. The proof goes by proving that there is a bijection between non-Euclidean labeled cycles in the original program and non-Euclidean labeled cycles in the dual. This bijection is quite simple and it has a very explicit formula.
