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Changing Perspectives on Changing Coordinates.

When teaching vector calculus, coordinate transformations are usually treated in somewhat haphazard way. Typically, we introduce the change of variables theorem for integration, and we hurry along before our students ask too many questions. This is understandable, since treating coordinate transformations in generality can quickly lead to differential geometry that our students are ill-prepared to learn.

In this talk we will argue that by using a CAS to perform the actual transformations, we can allow our students to explore different coordinate systems and the transformations between them in a deeper way. At the same time, we can drive home important topics such as unit basis vectors, orthogonal projection, and orientation. (Received September 24, 2012)