

Coordinate Transformations at Work

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I will describe a project undertaken by a local company and a mathematical problem they faced. The problem is of the type that must be familiar to many in local industry. There is a camera on an airplane. How to orient the camera so that the operator sees a target whose coordinates are known? Conversely, if the camera operator sees the target through the view finder, what are the coordinates of the target? (Curiously, the project is not military.) Solution involves some amount of analytic geometry plus a number of coordinate transformations and is mathematically unsophisticated. The devil is in the details, in particular, in finding common language, in agreeing on “definitions” and accuracy (I will give examples). Having graduate students in mind, I will mention a few related issues from linear algebra and multivariable calculus that illustrate advantages of mathematical training and make us helpful in applied projects.