

1116-S1-2498 **Robert Sachs*** (rsachs@gmu.edu). *Similarities in a first differential equations course.*

Similarity transformations help unify a large number of techniques commonly used in a traditional first course in differential equations. Many students and professors find these techniques to be a grabbag of tricks, but with a reformulation using similarity they become coherent, connected and sensible. These classical techniques include: solving the general first-order linear equation; finding the second solution of a constant coefficient equation with a double root in the characteristic equation; reduction of order more generally; the two methods of solving inhomogeneous linear equations (undetermined coefficients and variation of parameters); construction of the matrix exponential for first-order systems with constant coefficients; fundamental solution matrices; Laplace transforms. The use of operator notation hearkens back to factoring polynomials as a useful reformulation and also looks to parallel notions in linear algebra and ahead towards many more advanced topics. (Received September 22, 2015)