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Abstract: At some point, every math student discovers or is taught that solving simultaneous linear equations is completely algorithmic. Most don't know, however, that solving simultaneous polynomial equations is equally well understood. The solutions are algebraic numbers and algebraic functions. These may then be manipulated, (added, multiplied, simplified). All of this is not only algorithmic but has been implemented and is becoming very widely used. This comprises two thirds of the lecture, but in case you already knew all this, the last part of the talk will be on the much larger class of functions that solve a certain type of differential equation. These too may be manipulated algorithmically (this now includes calculus operations). The uses of this can be startling.