Abstract: If we are trying to minimize $f(x)$, it makes sense to look at $f'(x)$ as we have learned in basic calculus. If $x$ is a vector of parameters and if $f(x)$ is the solution of a set of differential equations which can take some time to solve, then finding $f'(x)$ is not easy. Adjoint methods give us a nice theoretical trick that can help us find a “descent” direction without actually computing the Jacobian of $f$. In this talk, I will walk through the steps of computing the adjoint for a simple 1D wave equation. The same procedure can be followed to obtain the adjoint of pretty much any system that allows integration by parts.