CPSC 498 Proposal

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For the capstone project, I would like to implement a Partial Differential Equation solver in C and build bindings to Swift, Java, and JavaScript. The Solver will be able to solve first order homogeneous partial differential equations, and homogeneous variants of the classical trinity,

$$u_{tt} - c^2 u_{xx} = 0, \qquad u_t - k u_{xx} = 0, \qquad \nabla^2 u = 0.$$

The solver will assume that the equations are being solved in Cartesian coordinates, and will have to be provided with explicit boundary conditions and initial conditions. If the equation cannot be solved, the program will respond accordingly.

Depending on time constraints, I will either implement a small ordinary differential equations solver, or I will use a third party library. This needs to be a feature of the program, since partial differential equations are commonly solved by using a technique that yields two ordinary differential equations.