CS 370 - Numerical Computation **Fall 2018**

Higher Order ODEs

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- We often encounter ODE's with higher order derivatives (i.e oscillating springs, pendulums, etc)
- the order of the ODE is the highest derivative that appears

5.1 Converting to First Order

For each variable y with more than a first derivative, introduce new variables

$$y_i = y^{(i-1)}$$

for i = 1 to n, so each derivative has a corresponding new variable
substituting the new variables into the original ODE leads to

1. One first order equation for each original equation
2. One or more additional equations relating the variables