Notes

- Even if you're not registered (not handing in assignment 1) send me an email to be added to a class list

Time Integration

- Recall Taylor series
- Linearization in higher dimensions
- Reduction to first order systems

- Well-posed problems: problem stability
- Linear analysis

Forward Euler

- Accuracy: truncation error vs. global error
- Algorithm stability
- Test Equation
- Stability region

More accurate explicit methods

- Leapfrog
- Multistep/multivalue methods
- Runge-Kutta methods
  - Heun's method (RK2)
  - Standard RK4

Error control

- Adaptive time stepping
- Integrator pairs

Stiffness

- A problem is stiff when an explicit integrator needs to take small steps for stability, not accuracy
  - Solution space includes very rapidly vanishing transients
- Note: not stiff just because you want to take large time steps
  - If the real solution has variations on a small timescale, there's no avoiding small time steps
- Usually handled with implicit integrators
- Backwards Euler