Lecture 25 Review

Finding eigenvalues and eigenvectors

`octave` calisthenics

Octave 1ˢᵗ ODE

Recall Volterra prey-predator equations

$$\begin{cases} dx/dt & = & x(a - by) \\ dy/dt & = & -y(c - dx) \end{cases}$$
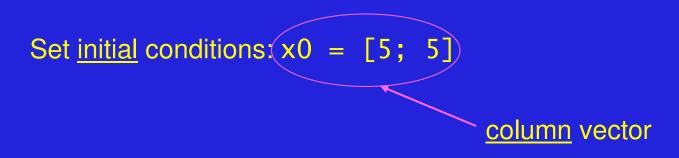
a = 1.0, b = 0.5, c = 0.95, d = 0.25

Solved previously w/ GSL routines.
Can be solved w/ `octave`

vectors

scalar

```
function xdot = vp(x,t)
    xdot = zeros(2,1);
        a = 1.0;
        b = 0.5;
        c = 0.95;
        d = 0.25;
    xdot(1) = x(1)*(a - b* x(2));
    xdot(2) = -x(2)*(c - d*x(1));


        endfunction
```

$$\frac{dx}{dt} = f(x,t)$$

1st ODE Solution via octave

Set <u>initial</u> conditions: x0 = [5; 5]

<u>column</u> vector

```
t =  linspace(0, 500, 1000);
y =  lsode("vp", x0, t);
```

<u>column</u> vector is returned

```
plot(t,y)
```

Change ICs. What do you see?

Planetary Orbits via `octave`

Solve for Earth's motion around the Sun using `octave`.

Produce a plot showing orbit !!

Summary

Solving ODEs w/ `octave`

Don't suffer in silence. Scream for help!!!

TE Coan/SMU