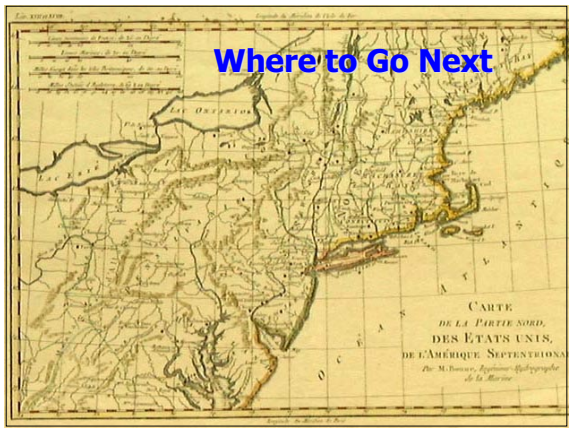

Outline

- Announcements:
  - Homework IV due Friday by 5, by e-mail
    - Absolutely no exceptions!
    - Answers will be posted on web
    - I will be available during office hours & by appt.
  - Homework III: answers on web
- Homework III
- What you know
- What I haven't told you, & where to find out more
- Course Evaluations

Homework III

- Most did well
- Swan Modeling
  - Each iteration j
    - compute B(N(j)), D(N(j)), P(N(j))
    - if(random #<P) N(j+1)=N(j)+1 else N(j+1)=N(j)-1 end
    - compute dt
    - t(j+1)=t(j)+dt

Swan Modeling

- Can do iterations with for or while loops:

```
for j=1:MAXEVENT-1
      <Get N(j+1) & t(j+1)>
      if(N(j+1)<=0) break;end
end
```

- or

```
j=1;
while(j<MAXEVENT & N(j)<0)
      <Get N(j+1) & t(j+1)>
      j=j+1;
end
```

- then
  - N=N(1:j+1) (for loop) or N=N(1:j) (while loop) to delete unneeded elements

Swan Experiment

- Initialize counters: extinct=0; trials=100;
- Call your function 100 times
- analyze t and N to determine if extinct before 20 years

```
n=length(t)
if(t(n)<=20 & N(n)<=0)
      extinct=extinct+1;
elseif(t(n)<20)
      trials=trials-1;
end
```

- Then, Prb{extinct before 20}=extinct/trials

What Do You Know?

	Data →	Program →	Output
Currents	SSH	Geostropic eq.	U,V,plot
Weather	T,V,M	Finite diff.	T,V,M in future
Bioinfomatics	ATCGCGTA…	Search for genes	Location of genes
Electronics	Signal	FFT	Plot of spectrum

- You know enough Matlab to do solve any of these problems

What Do You Know?

- You know how to
  - get ASCII and binary data into Matlab
  - data are stored in arrays (vectors, matrices, ND-arrays)
  - Manipulate data with array operations
    - find, relational and logical operators
  - get data out of Matlab

What Do You Know?

- You know that Matlab has built in functions for
  - statistics
  - graphics
  - solving ODE's
  - solving linear systems and analyzing matrices

What I Haven't Told You

- Matlab has lots of functions, and you'll never know them all
  - learn about functions through
    - help, helpwin, or help browser (through GUI)
    - www.mathworks.com

What I Haven't Told You

- Other important packages
  - signal processing (beyond FFT)
  - splines (turn anything into a smooth function)
  - finance (follow the money)
  - mapping (explore your world)
  - optimization (the best of all possible worlds)
  - Simulink (GUI for creating dynamical systems)

What Do You Know?

- You know how to extend Matlab's capabilities through functions
  - function [outputs]=fname(inputs);
- And that Matlab is a procedural programming language
  - Iterations with for & while loops
  - Conditionals with if-elseif-else-end
  - error(estring)
- And that Matlab functions can be polymorphic
  - nargin, varargin, etc.

What I Haven't Told You

- Matlab is more than just arrays of doubles
  - structs--similar to C-structs or Java objects
    - Create a variable called student with fields:
      - name--string with student's name
      - ID-- a number
      - balance--balance on Bursar account
      - hold--(logical) Bursar hold status (always true)
    - Get data out with student.fieldname

What I Haven't Told You

- Cell-arrays are arrays of anything
  - C=cell(3,1); %creates a cell-array with 3 elements
  - C{1}=[1:3]; C{2}=student; C{3}=randn(1000);
- Cell-arrays are especially useful for holding text data

Other Scientific Computing Courses

- CS421--Introduces basic concepts and issues in scientific computing and numerical analysis
- CS621, CS622, CS624--Advanced scientific computing and numerical analysis (Matrices, Optimization, ODE/PDE's)
- Math and Applied Math offer courses on linear algebra, ODE/PDE's
- Domain-specific courses in your department

Other Scientific Computing Courses

- CIS Tools Curriculum
  - Fall: MATLAB
    - 401: the basics
    - 402: visualization (starts October 15)
  - Spring: General tools
    - 403: Developing scientific computer programs (compilers, debuggers, managing large projects)
    - 404: Numerical libraries

Evaluations

- Please give me as much data as you can
  - specific lecture/topics you liked & those you didn't
  - other topics to cover?
  - Tools Curriculum & mini-course format?
- Thanks!