Algorithmic Approaches for Biological Data, Lecture #1

Katherine St. John

City University of New York
American Museum of Natural History

20 January 2016

Outline

- Course Overview
- Introduction to Python Programs:
  - printing and simple functions
  - definite loops
  - Problem solving and the design process
- Recap

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- Professor, City University of New York
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- Associate Academic Director, BridgeUp:STEM
- Postdoctoral Work at University of Texas and University of Pennsylvania
- PhD, UCLA
- MA, Johns Hopkins University
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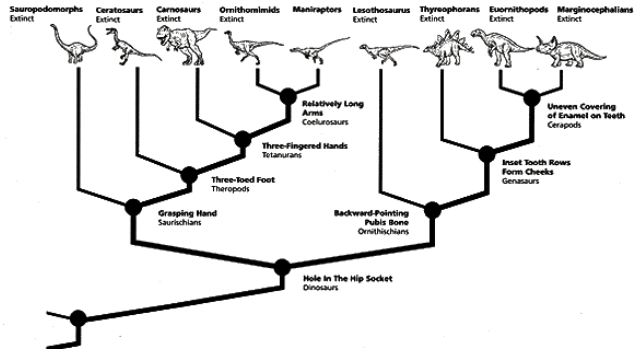

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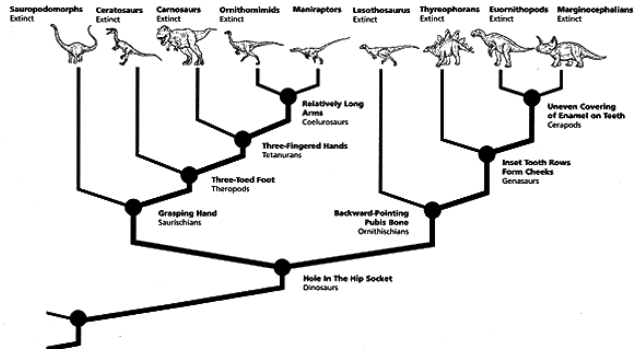

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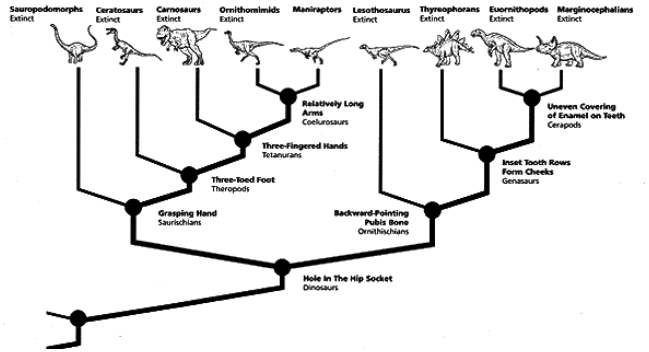

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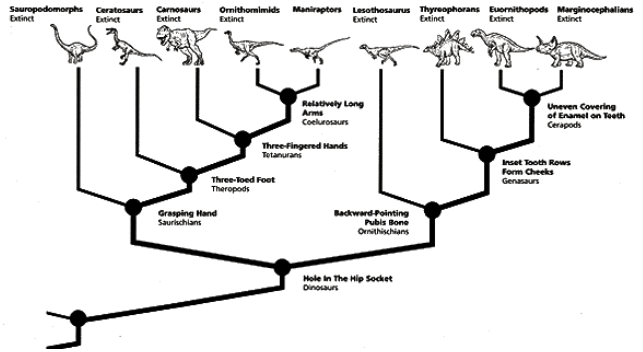
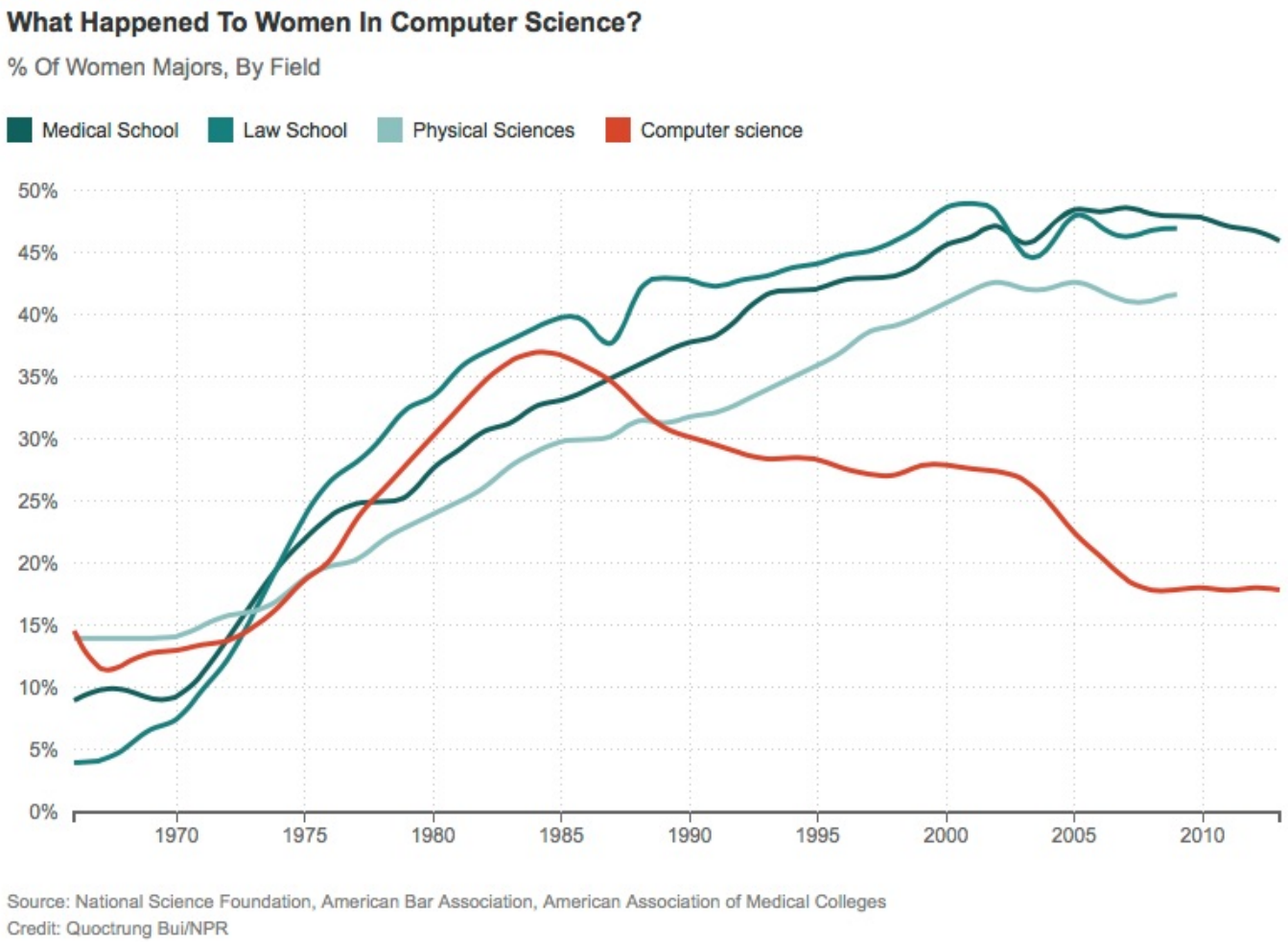
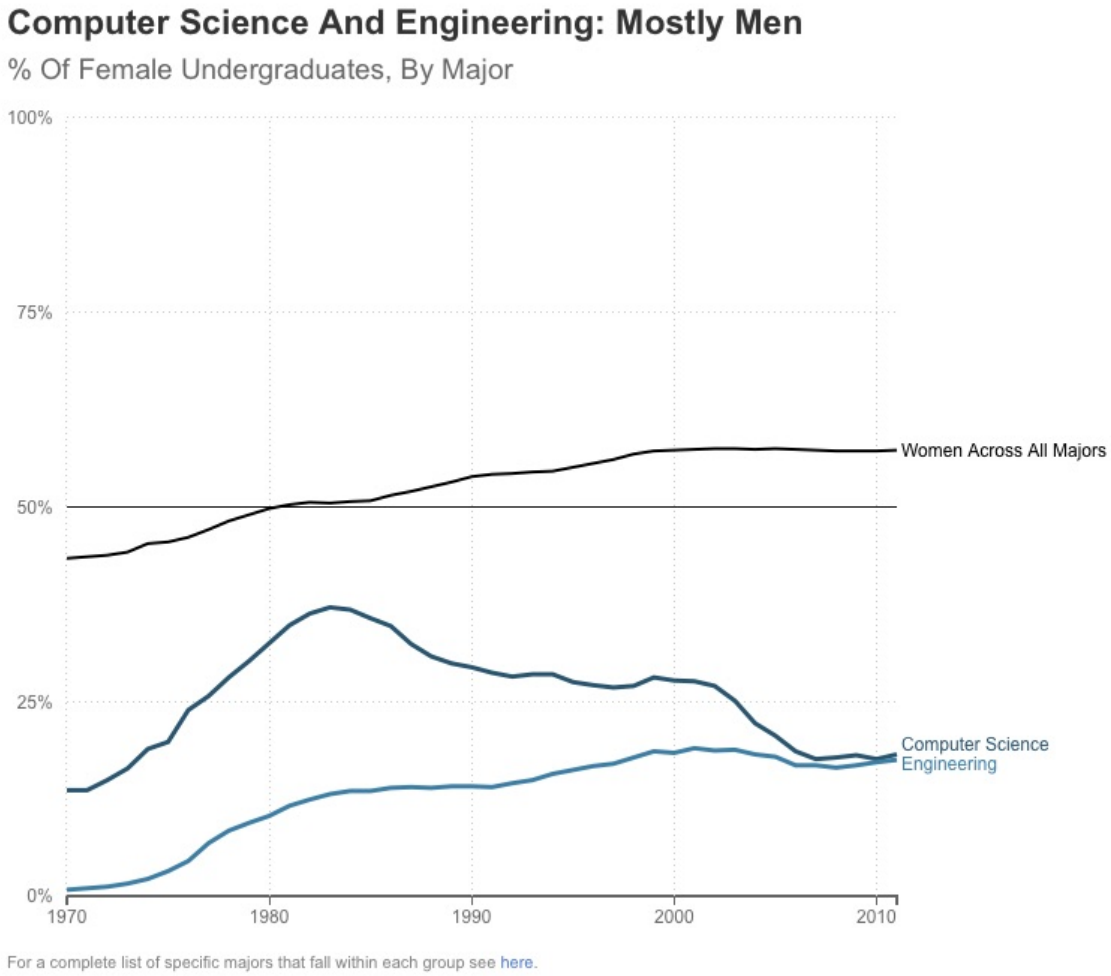


Historical Trends: Women Majors



NPR Planet Money, October 2014

Historical Trends: Computer Science & Engineering



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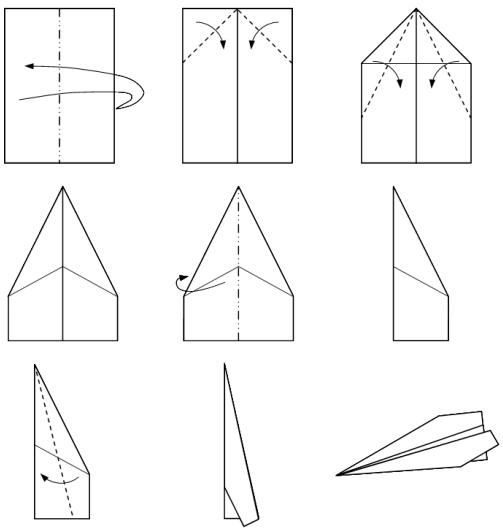
Course Website and Syllabus

All course material available at:

`comet.lehman.cuny.edu/stjohn`

Algorithms



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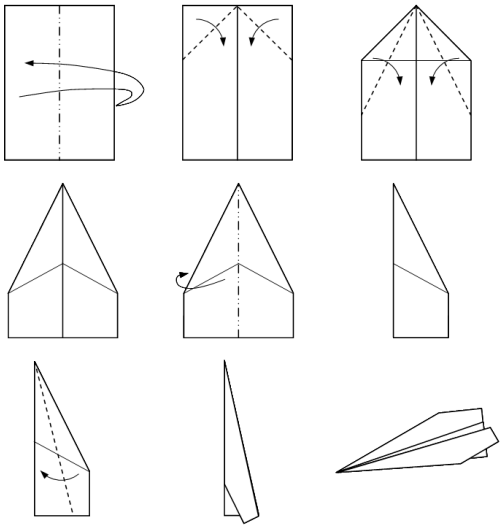

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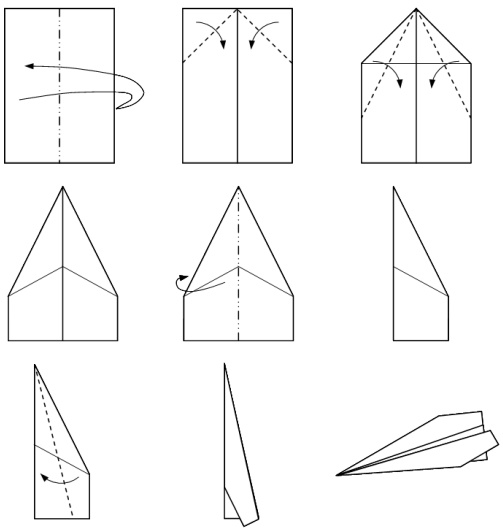

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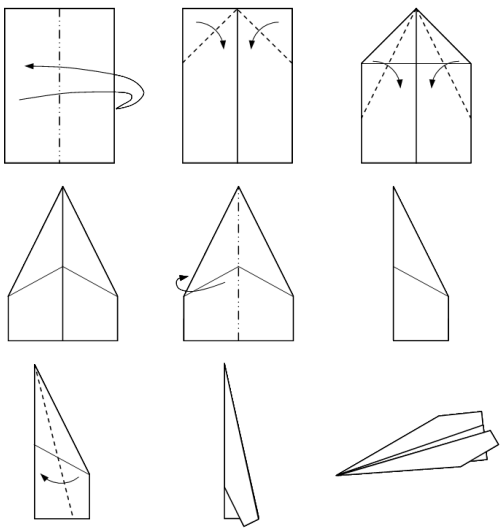

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- Altering directions to improve the solutions is a key technique (called step-wise refinement)

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- `IDLE` is a simple integrated development environment included with all Python distributions.

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>>> print "Hello world"
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- ">>>": python prompt
- "print": prints to the terminal

Second Python Program

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>>> tess = turtle.Turtle()
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    tess.forward(100)
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- "tess.home()": return to center

Saving Files

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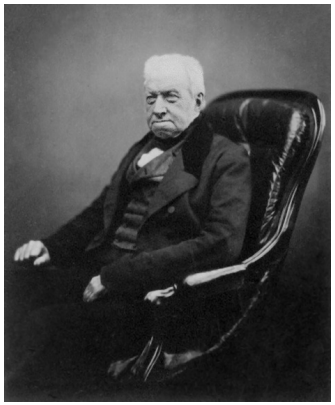
- Type your Python commands into the file window.
- Save as a `.py` file (e.g. `first.py`) to allow color-coded text.
- Run your program by choosing *Run Module* from the *Run* module.

Challenges

- Draw a hexagon.
- Draw an octagon.
- Draw a 5-pointed star.
- Print your name to the screen 100 times.

Modeling Brownian Motion



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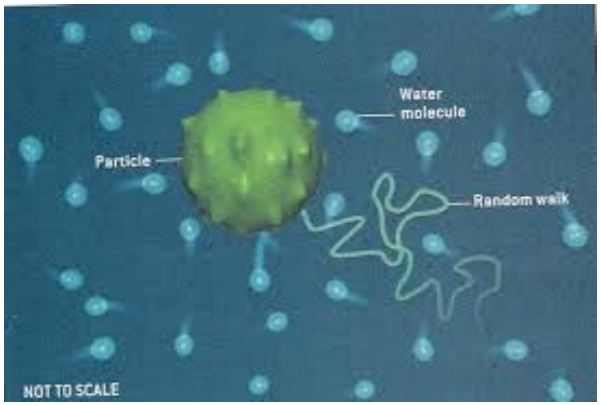

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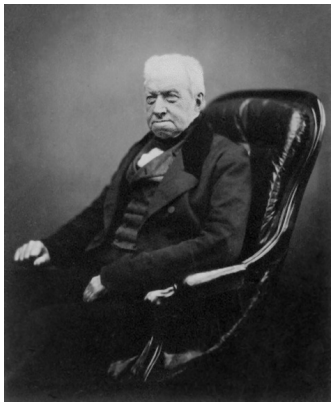

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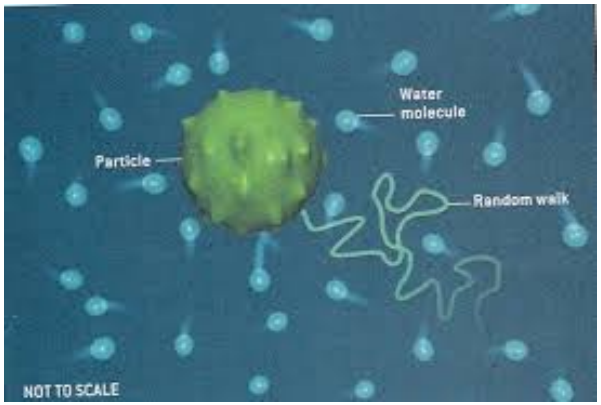

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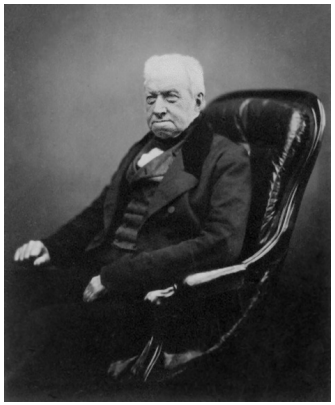

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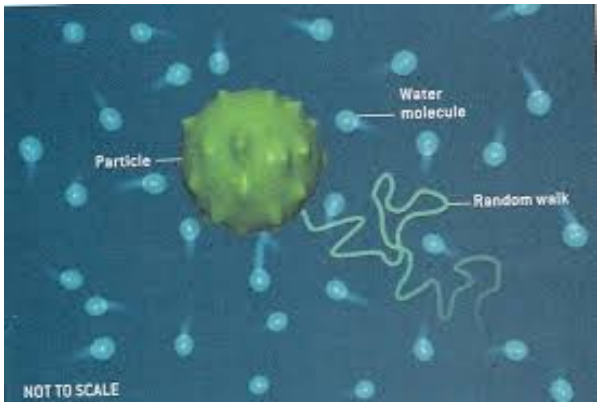

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- Brownian motion refers to the random motion of particles in water, as well as the underlying mathematical model.

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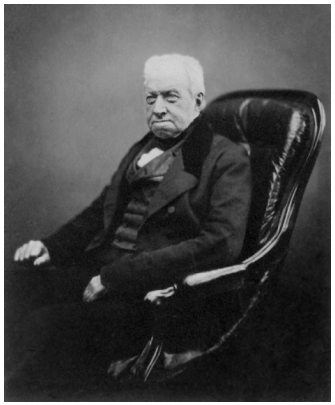

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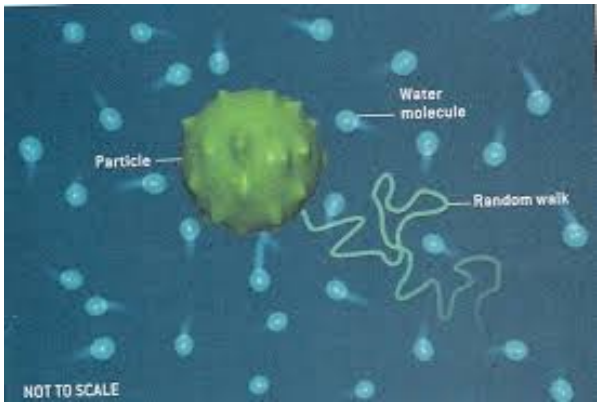

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- Good model for the scattering of light and diffusion of substances

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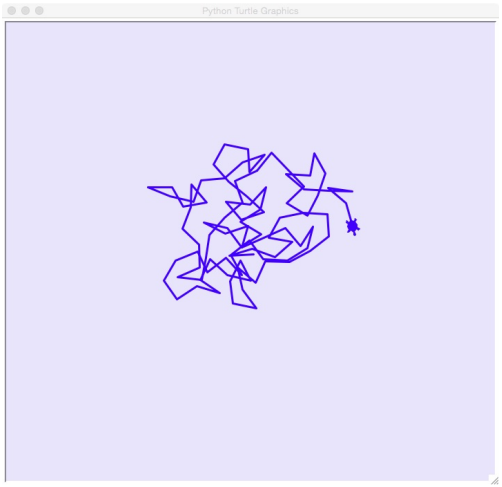

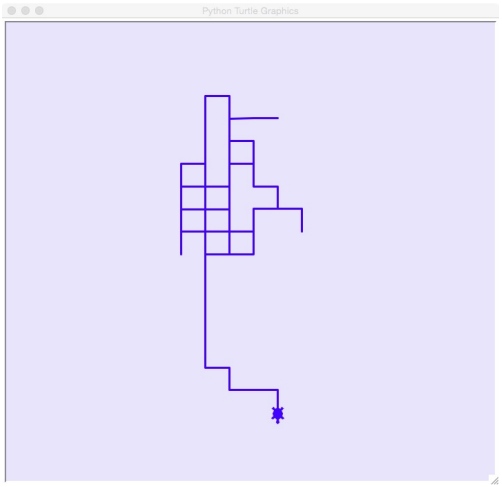

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1. Create a turtle
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- Implement and test your design.

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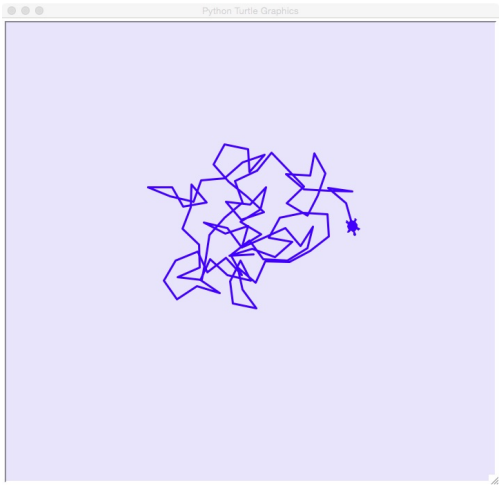

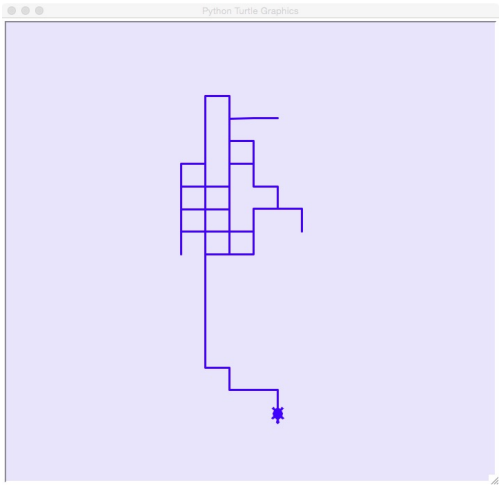

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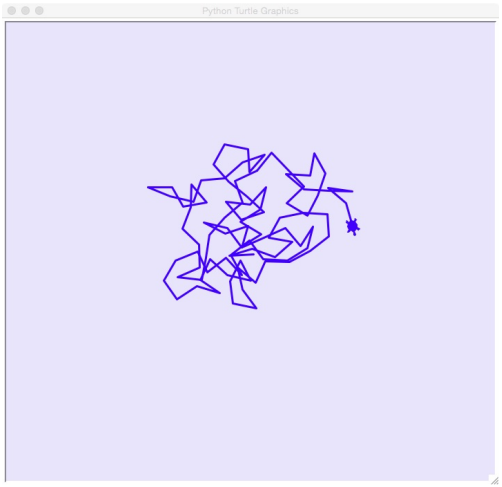

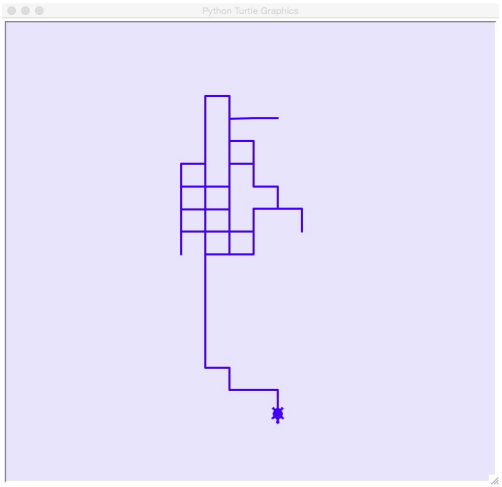

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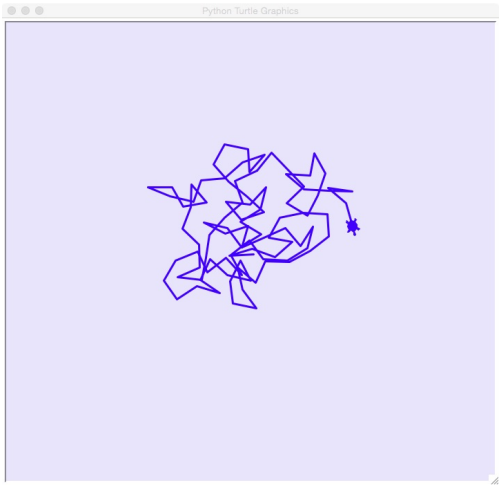

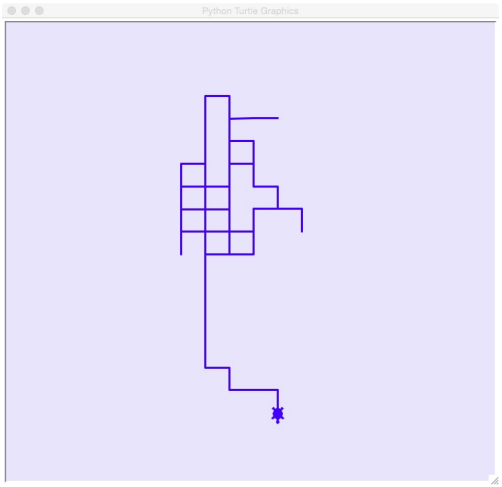

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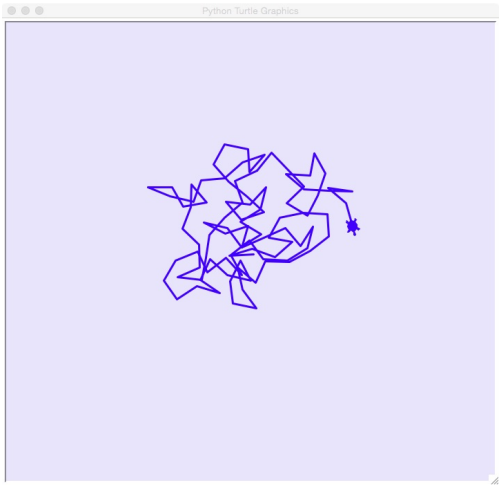

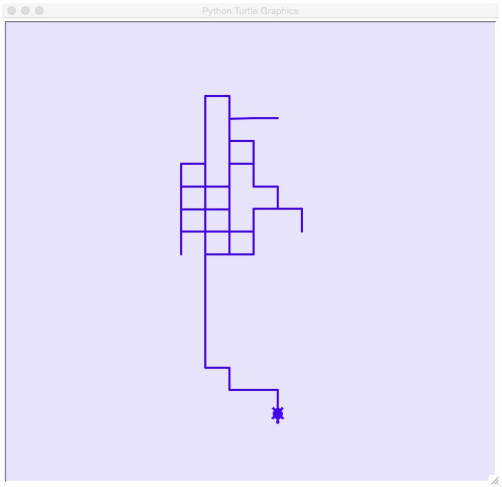

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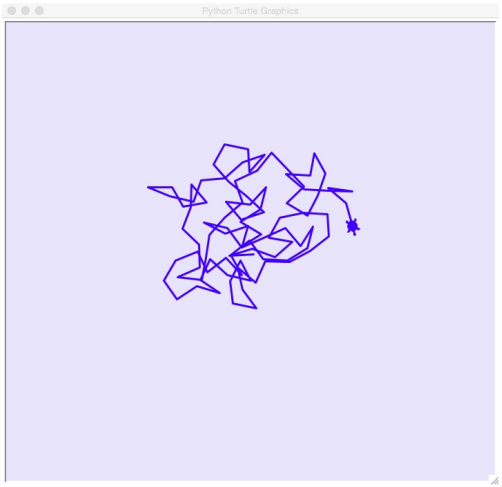

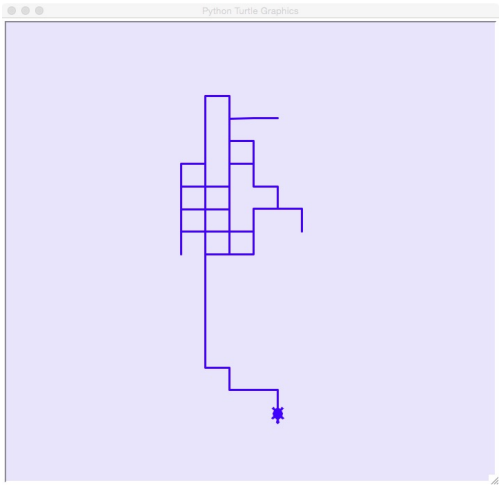

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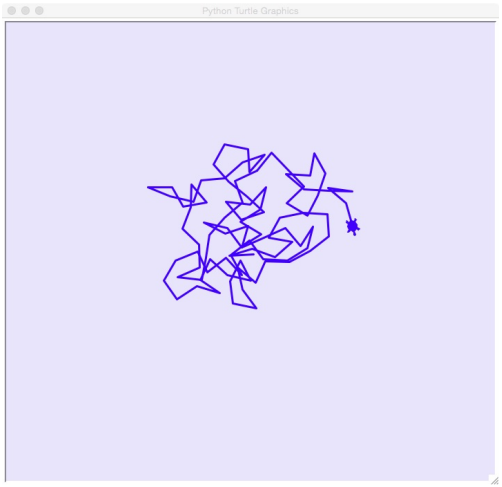

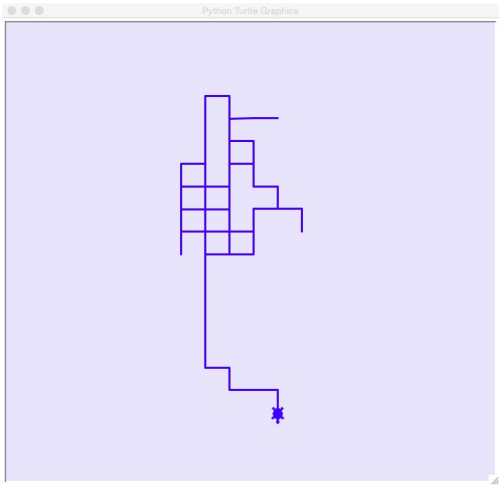

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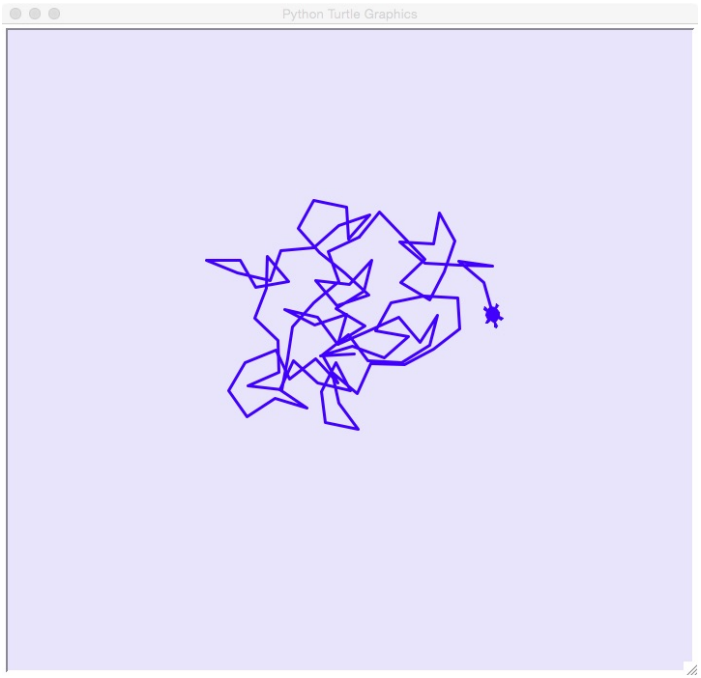
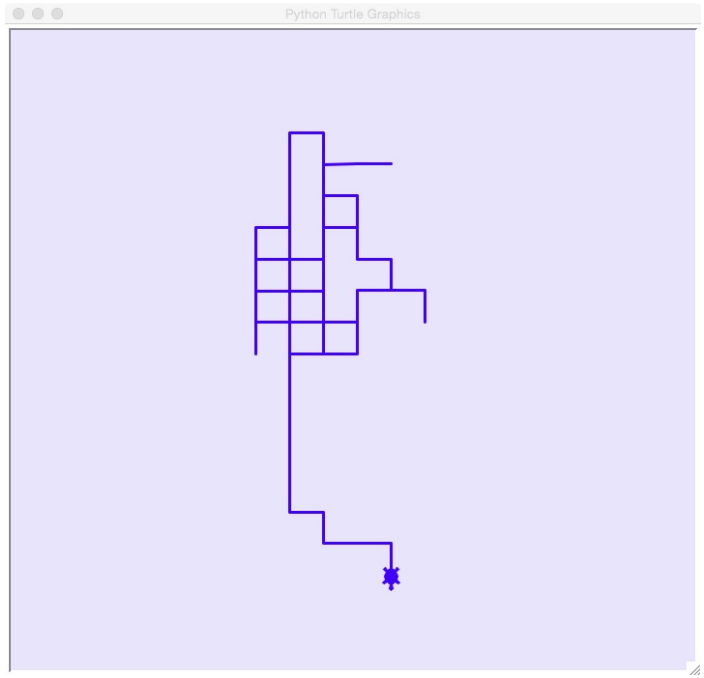
- 1D Random Walks: Change the direction line to: `right(random.randomrange(0,360,180)`

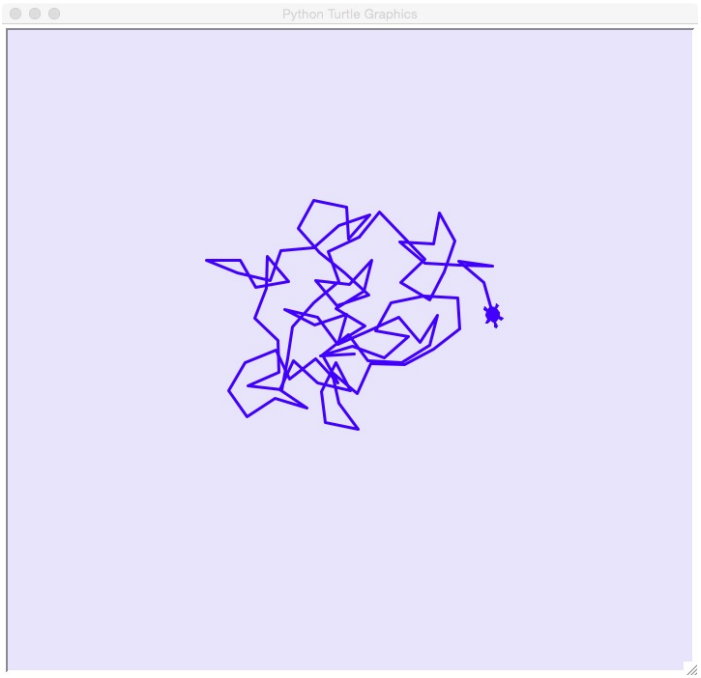
Recap

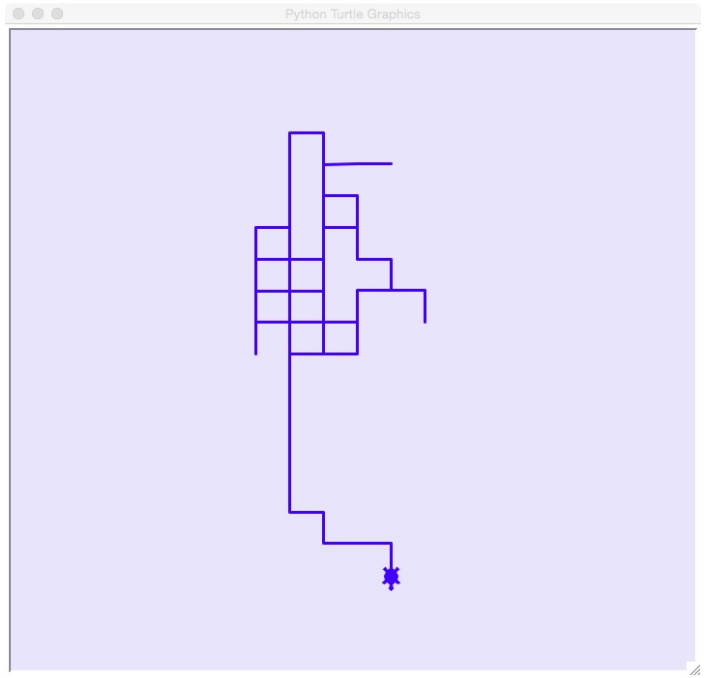




- Lab session at 3pm today (bring laptop!).

Recap





- Lab session at 3pm today (bring laptop!).
- Challenges available at `rosalind.info` (use emailed link to access course page).