Chapter 2 outline:

- Mathematical sequences and Python lists (last week Wednesday)
- Recurrence relations and recursive functions (last week Friday)
- Functions on lists (Monday)
- More functions on lists (Wednesday)
- Arrays, vectors, and intervals (**today**)
- Review Chapter 1 & 2 (next week Monday)
- Test on Chapters 1 & 2 (next week Wednesday, Sept 25)

Today:

- Context for learning about Python arrays
- Python arrays (ndarray) themselves
- Arrays as models for concepts in other fields
  - Vectors
  - Matrices
  - Intervals
  - Data sets

Goals of this course

- Write programs in the functional style
- Think recursively
- Understand sets, relations, and functions so that they can model real-world (and abstract) information
- Use formal logic to prove mathematical propositions.

Concepts of the first two chapters

- Sets and their operations
- Sequences
- Python expressions, types, and functions
- Python sets and lists
- Recursive algorithms

Points of this section

- Python arrays, like lists, represent sequences.
- Python arrays have more features than lists, especially multidimensionality.
- Python arrays model/represent vectors, matrices, intervals, and data sets.

$$
\begin{array}{rrrcr}
3x_0 & +2x_1 & +\frac{1}{2}x_2 & = & -\frac{4}{3} \\
-4x_0 & -x_1 & +10x_2 & = & 5 \\
\frac{1}{8}x_0 & +\frac{2}{3}x_1 & +x_2 & = & 7
\end{array}
$$

$$
A\vec{x} = \vec{b} \quad \text{or} \quad \begin{pmatrix} 3 & 2 & \frac{1}{2} \\ -4 & -1 & 10 \\ \frac{1}{8} & \frac{2}{3} & 1 \end{pmatrix} \begin{pmatrix} x_0 \\ x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} -\frac{4}{3} \\ 5 \\ 7 \end{pmatrix}
$$

For next time:

Do Exercises 2.4.(1-8). (That's all the exercises in Section 2.4.)

Exercises 2.4.(1, 2, and 4) are plain-old on paper problems.

Exercise 2.4.3 is a programming exercise to be done in an accompanying notebook.

For Exercises 2.4.(5-8), you are asked to execute Python expressions and draw conclusions on the results. You can find the expressions themselves in the notebook with the stub for Ex 2.4.3; please write your observations/conclusions (that is, your answers to Exercises 2.4.(5-8)) on paper with your answers to Ex 2.4.(1,2, & 4).

(No reading or quiz. . .)