Chapter 2 outline:

- Mathematical sequences and Python lists (**today**)
- Recurrence relations and recursive functions (Friday)
- Functions on lists (next week Monday)
- More about functions on lists; sorting (next week Wednesday)
- Arrays, vectors, and intervals (next week Friday)

Today:

- Revisit powersets
- Basics of Python lists
- Definition of sequence
- Operations on Python lists

Note that

- $a \in A$ iff $\{a\} \in \mathscr{P}(A)$
- $A \subseteq B$ iff $A \in \mathscr{P}(B)$
- $A \subseteq B$ iff $\mathscr{P}(A) \subseteq \mathscr{P}(B)$
- $\mathscr{P}(\varnothing) = \{\varnothing\} \neq \varnothing$

Observe

$$\mathscr{P}(\{1,2,3\}) = \{\ \emptyset,\ \{1\},\{2\},\{3\},\ \{1,2\},\{1,3\},\{2,3\},\ \{1,2,3\}\ \} = \{\ \{1\},\{1,2\},\{1,3\},\{1,2,3\},\ \emptyset,\{2\},\{3\},\{2,3\}\ \}$$

$$= \mathscr{P}(\{2,3\}) \cup \left[\begin{smallmatrix}\text{1 added to each set}\\ \text{of } \mathscr{P}(\{2,3\})\end{smallmatrix}\right] = \mathscr{P}(\{2,3\}) \cup \{\ \{1\} \cup X \mid X \in \mathscr{P}(\{2,3\})\ \}$$

If $a \in A$, then $\mathscr{P}(A) = \mathscr{P}(A - \{a\}) \cup \{\ \{a\} \cup X \mid X \in \mathscr{P}(A - \{a\})\ \}$

What is $|\mathscr{P}(X)|$ in terms of $|X|$?

$$[24_1, 47_2, 53_3, 18_4, 201_5]$$

$$[98_{101}, 99_{102}, 88_{103}, 84_{104}, 99_{106}]$$

$$[2_\alpha, 3_\beta, 5_\gamma, 7_\delta, 11_\epsilon, 13_\zeta, 17_\eta]$$

$$[\bullet_0, \heartsuit_1, \bigstar_2, \bullet_3, \spadesuit_4, \spadesuit_5]$$

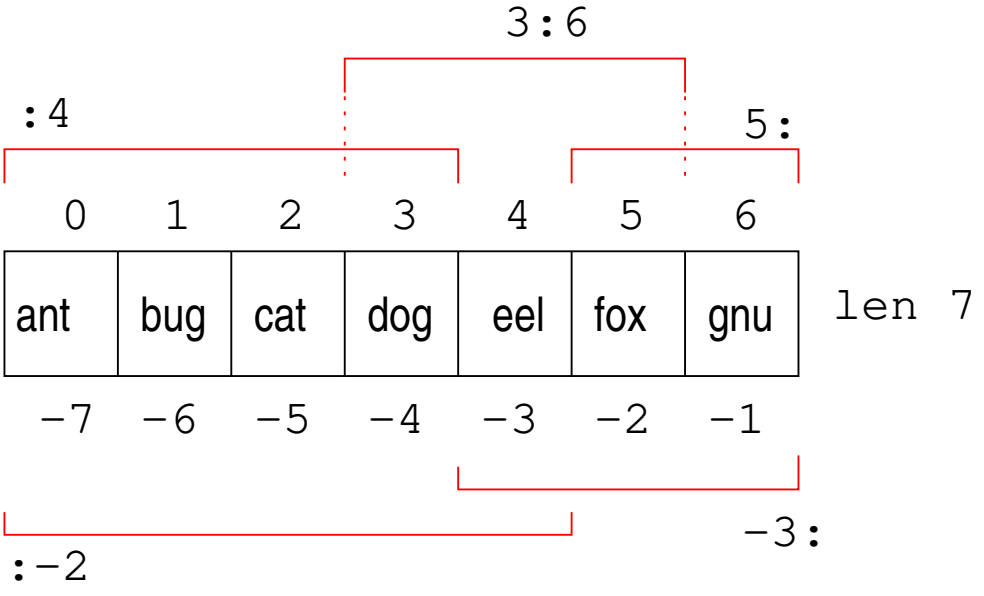
$$[1_0, 2_1, 4_2, 8_3, \ldots (2^i)_i, \ldots]$$

$$[5+i] = [5,6,7,8,9,\ldots]$$

$$\left[(-1)^i\right] = [1,-1,1,-1,1,\ldots]$$

$$\left[\frac{1}{2^i}\right] = \left[1,\frac{1}{2},\frac{1}{4},\frac{1}{8},\frac{1}{16}\ldots\right]$$

$$[i^2] = [0,1,4,9,16,\ldots]$$


3:6
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0 1 2 3 4 5 6
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For next time:

Pg 69–70: 2.(3, 4, 5, 7, 8, 10)

Read 2.2

Take quiz