61A Lecture 36

Friday, December 6

Announcements

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  - Recursion and recursive data
  - Iterators, generators, and streams

Generators Example

Example: Numerical Approximations

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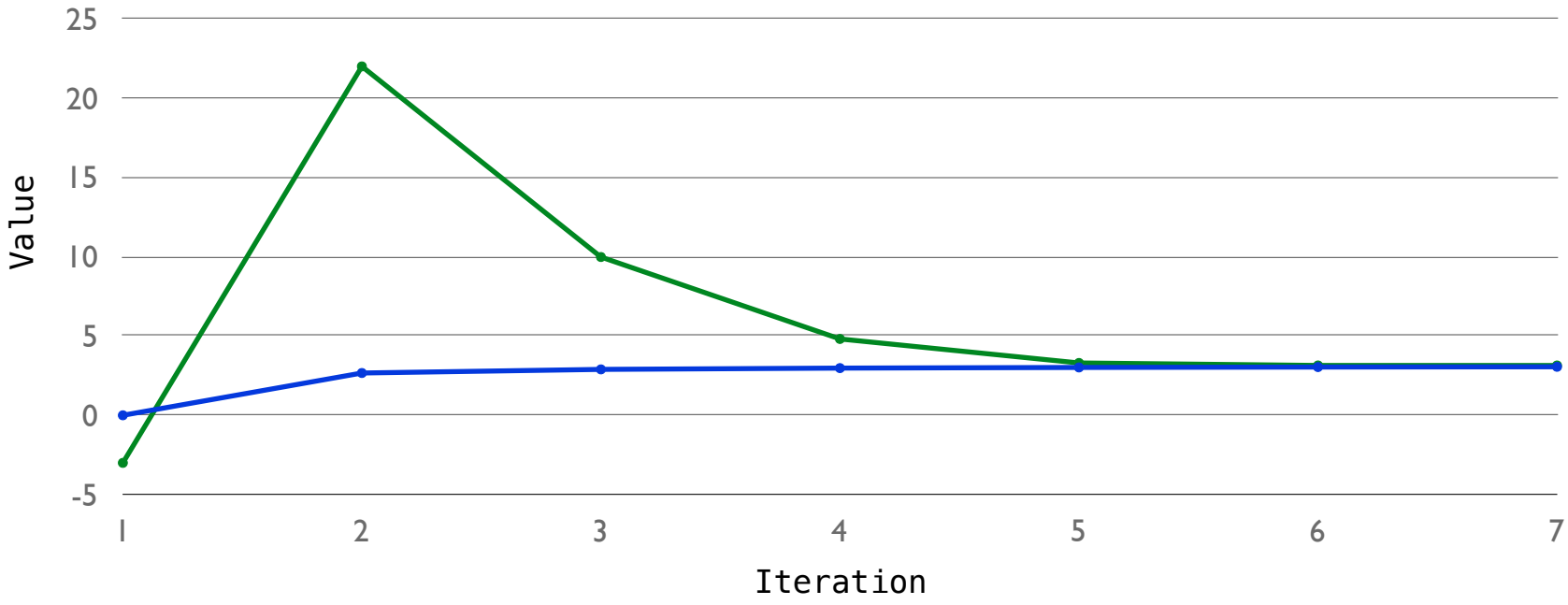

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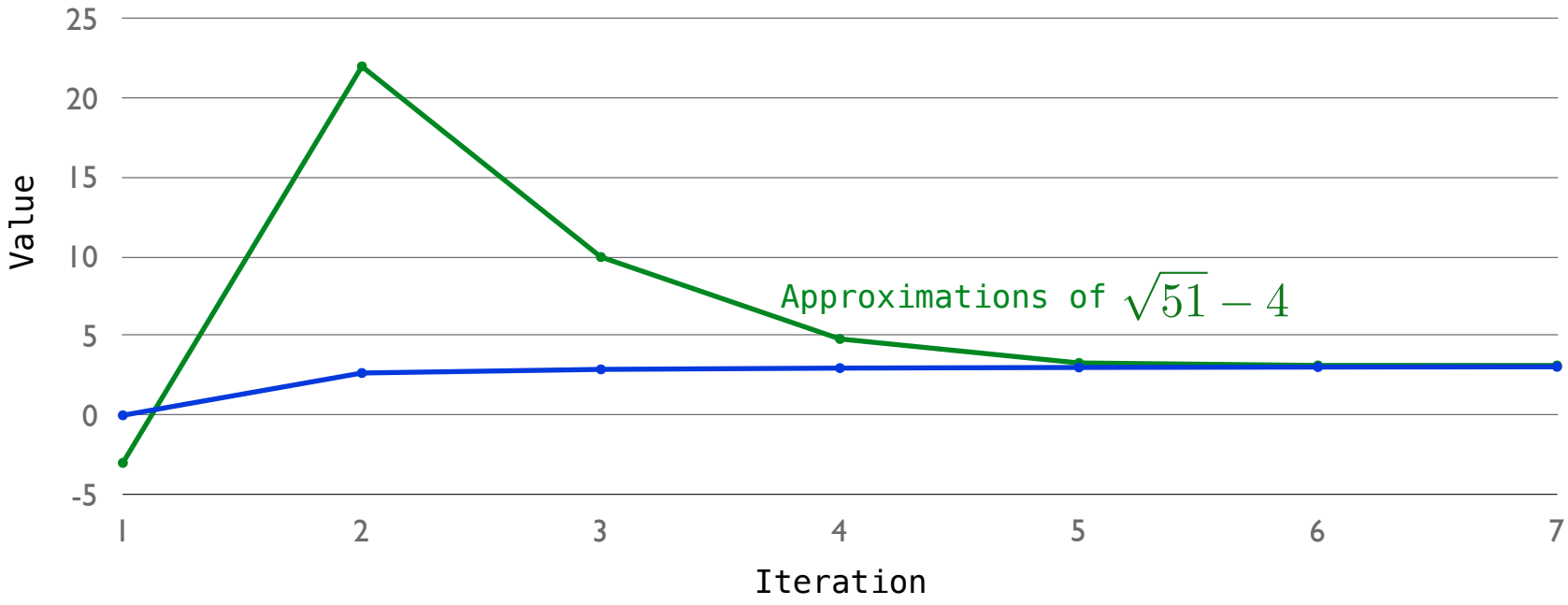

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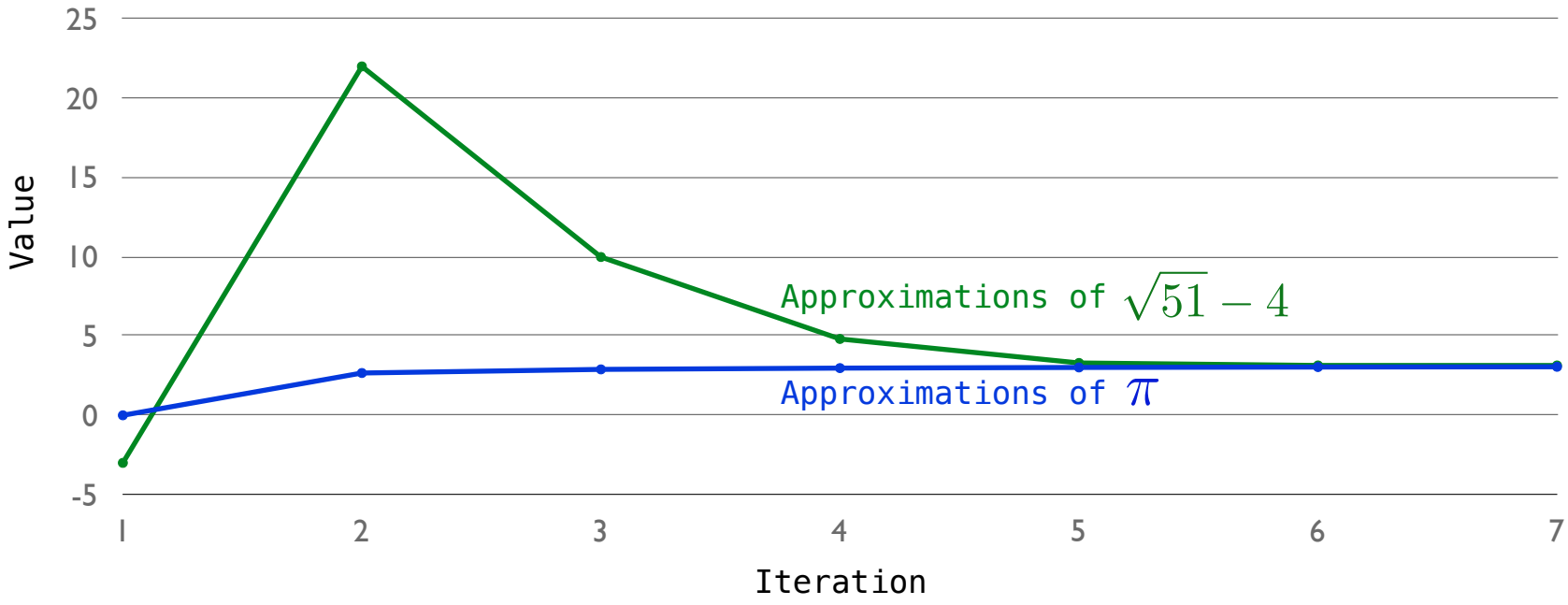

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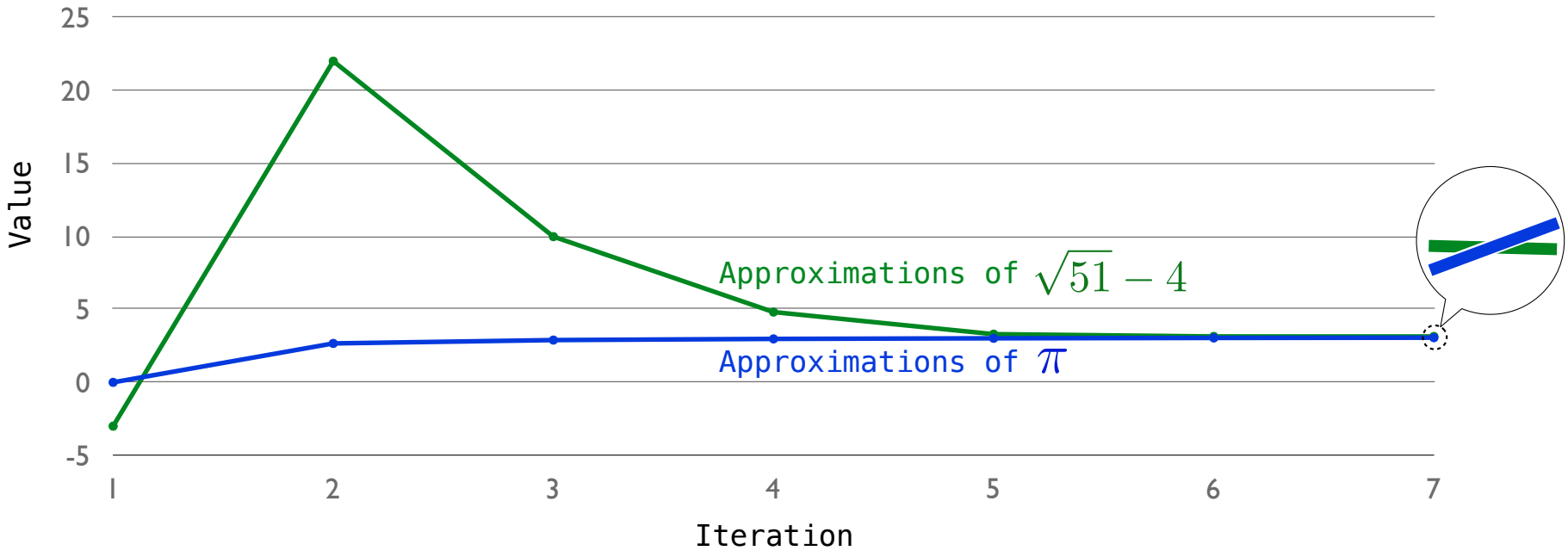

Approximating Square Roots

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(A) A sequence of approximations (SoA) to **y** is an infinite sequence that converges to **y,** where each element is closer to **y** than the last. Define a SoA to $\sqrt{a}$ **.**

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Idea: Iteratively refine a guess x about the square root of a.

$$x = \frac{x + \frac{a}{x}}{2}$$

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```
def sqrt(a):
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    while _____________________________________:
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```

```
>>> for x in sqrt(2):
...     print(x)
1
1.5
1.4166666666666665
1.4142156862745097
...
```

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>>> for x in pi():
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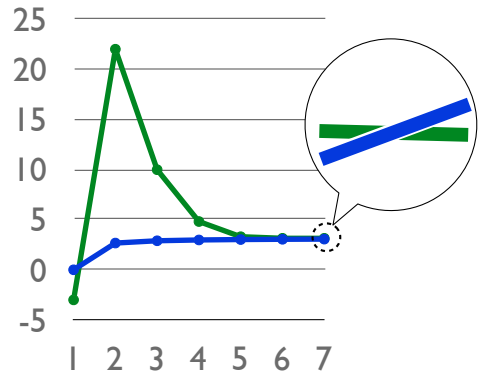

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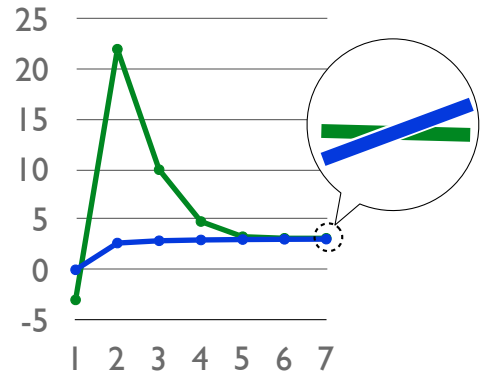

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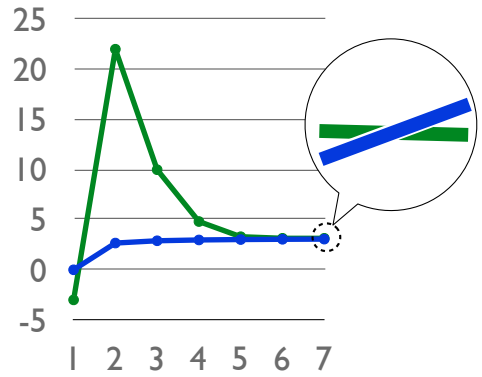

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>>> less_than_0(subtract(a, pi()))
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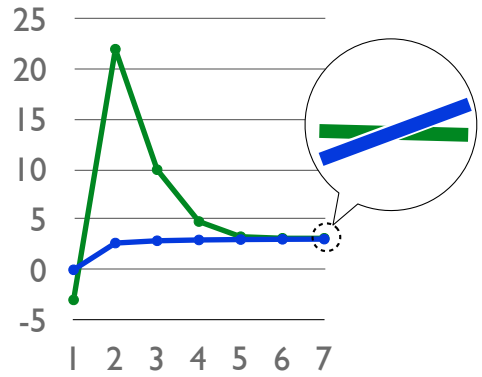

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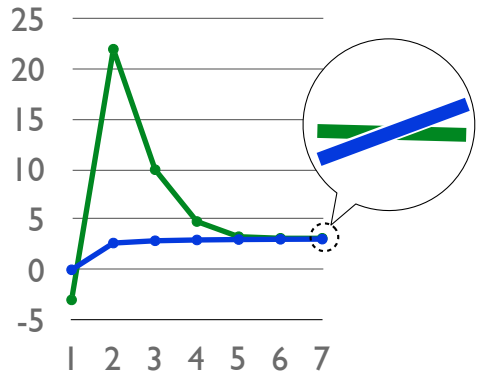

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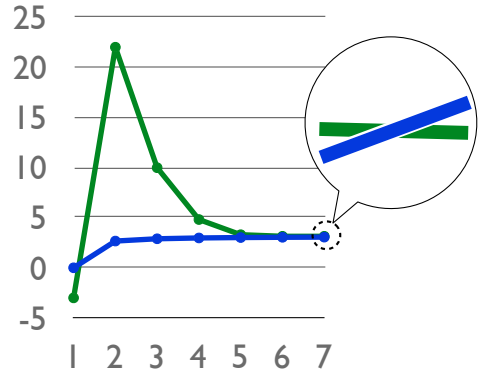

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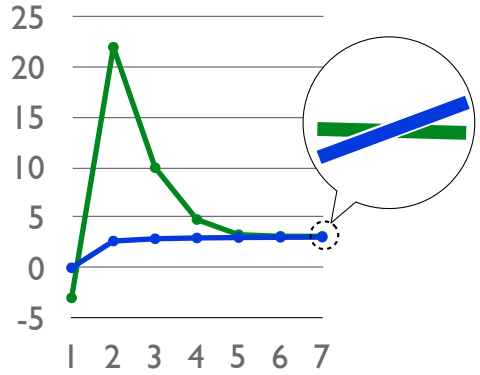

(Demo)

Computer Science

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Different programming paradigms: functional, object-oriented, and declarative.

What's left to learn in CS?

- Designing and testing software
- Algorithms for solving known problems
- Low-level representations of data and programs
- Discrete mathematics and analysis of programs
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- *User interface design*
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- *Lots of other subfields: graphics, theory, scientific computing, security, etc.*

Life

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Thanks for being amazing!

Please stay for the HKN survey.