#6 Orders of Growth & Linked Lists

TA: Jerry Chen (jerry.c@berkeley.edu)

"Testing shows the presence, not the absence of bugs."

Edsger Dijkstra
*With outliers removed (you know who you are)
With outliers removed (you know who you are)
With outliers removed (you know who you are)

63 ft
19 m

Average: 66.4
Orders of Growth

Some quick rules

• In the class, we care about **average case performance** (big $\Theta$)
• Simplify by removing constants
• Simplify by keeping largest terms
Θ(\log n + n / 2)
Θ(\log n + n)
Θ(n)
Θ(\log_{10} n)
$\Theta(\log n / \log 10)$
Θ(\log n)
\( \Theta(n \log n) < \Theta((\log n)^{\log n})? \)

Disclaimer: this isn't a mathematically precise way of comparing growth functions. This is also probably beyond typical exam difficulty in this course.
Θ(n \log n) < Θ((\log n)^{\log n})
$\Theta(\log (n \log n)) < \Theta(\log [(\log n)^{\log n}])$
$\Theta(\log n + \log \log \log n) < \Theta(\log \left(\log n\right)^{\log n})$
$\Theta(\log n + \log \log \log n) < \Theta(\log n \log \log \log n)$
$\Theta(\log n) < \Theta(\log n \log \log n)$
First

Rest
l = Link(2, Link.empty)
\[ l = \text{Link}(1, l) \]
\( l = \text{Link}(1, l) \)
l.rest.rest = Link(3)
l.rest.rest = Link(3)
$l = [2, 3, 4, 5]$
\[ l = [2, 3, 4, 5] \]
l.insert(0, 1)
l.insert(0, 1)
l.insert(0, 1)
l.insert(0, 1)