

Intro CP 6/15/26

This Week

Work on your Proj (M-W)

Thursday - Final Contest (no cpsolving)

C2 - cpsolve M, T

bootstrapping number

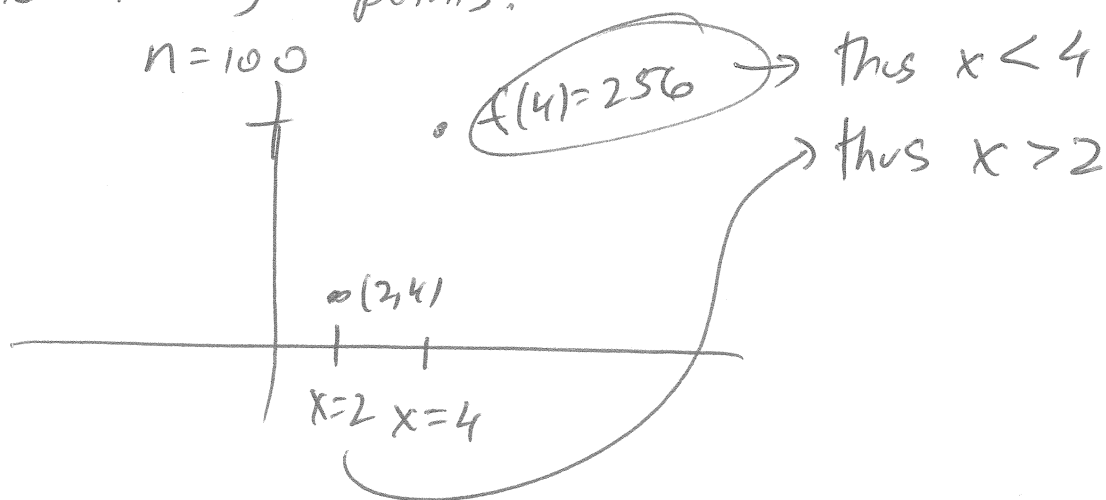
$f(x) = x^x$, given n find x such that $f(x) = n$.

① easy to solve forwards (given x find $f(x)$)

② but I'm asked to do backwards

③ function is increasing (or decreasing) - no turning points.

low = 0
high = 10



traditional binary search:

Given a sorted array, determine if some number is in it or not

0	1	2	3	4	5	6	7	8	9
2	10	11	19	20	100	120	140	200	260

$\uparrow$ low
 $\uparrow$ mid
 $\uparrow$ high

Search 11

$$mid = (low + high) / 2$$

if (val < a[mid])

high = mid - 1;

else if (val > a[mid])

low = mid + 1;

Real-Valued Binary Search

Very careful setting low/high

Fixed # iterations (≤ 100) ²⁵⁰

Set low or high = mid
during iteration

* function forwards is easy
backwards (inverse) is hard
function either increasing or
decreasing (no turning pts)

Integer Binary Search

while loop (until low == high)
or low > high

Trace
low 2
high 3

mid = (low + high) / 2 or
(low + high + 1) / 2;

Depends on your conception of the
problem.

Very careful w/ initial settings of
low, high

mid = low + 1 or mid = low } depends
mid = high - 1 or mid = high } on your
conception of the problem

$$\begin{bmatrix} a \\ a \\ \vdots \\ \vdots \\ x \end{bmatrix}$$

$$\begin{bmatrix} \cancel{a} \\ \cancel{a} \\ \cancel{a} \\ \cancel{a} \\ \cancel{a} \\ \cancel{a} \\ \cancel{a} \\ \cancel{a} \\ x \end{bmatrix}$$

end

$$\boxed{3 \text{ a's}}$$

curCnt

$$x \leftarrow \text{end} \checkmark$$

$$\begin{bmatrix} \vdots \\ \vdots \end{bmatrix} \leftarrow \text{curCnt}$$

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while (curCnt >= 0) {
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while 1
// ONE SEG

3

while loop to
'x' or out of bounds