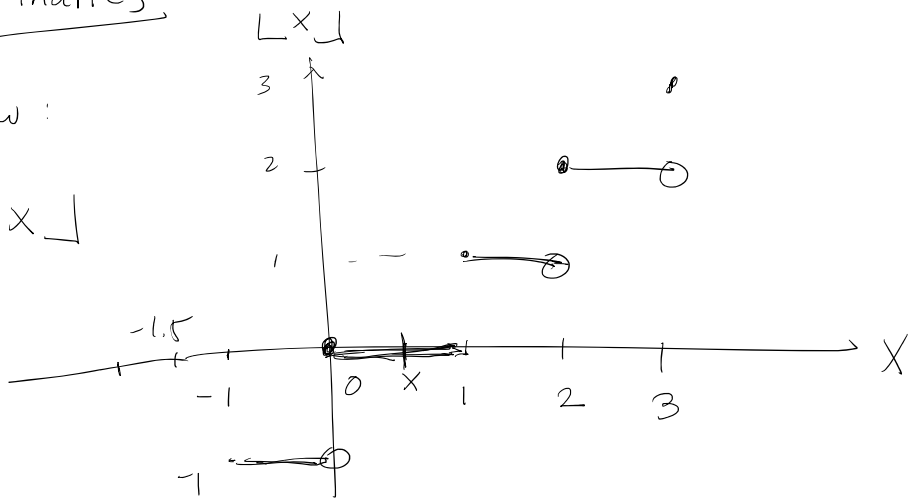
Preliminaries

Review:

$\lfloor x \rfloor$



$\lfloor -1.5 \rfloor = \{ -1, -2 \}$

Math. Induction

P(n): statement to be proved

✓

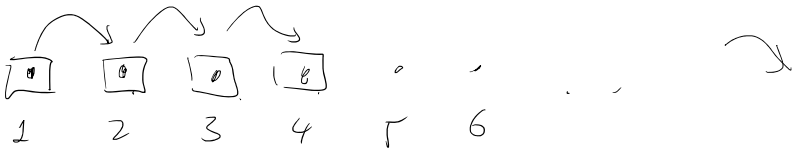
base case — n = 1 ✓

Induction Assumption: P(n) Assumes True

show P(n+1) is true } If P(n) then P(n+1)

Then Principle of M.I. ✓

tells use P(n) is true for all n.



Sets

Multi sets

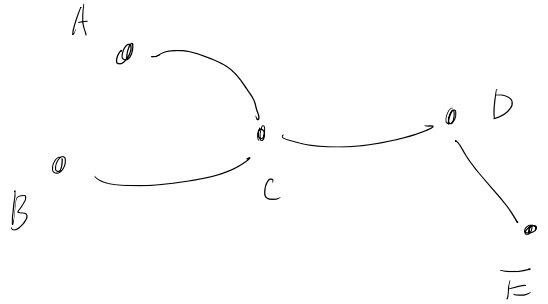
$A = \{1, 2, 3\}$

$B = \{1, 2, 3, 3, 1\}$

$A \stackrel{?}{=} B$ (if A, B are sets) ✓

(if A, B are multi-sets)

Class example



→ Tree

Vertices $= \{A, B, C, D, E\}$

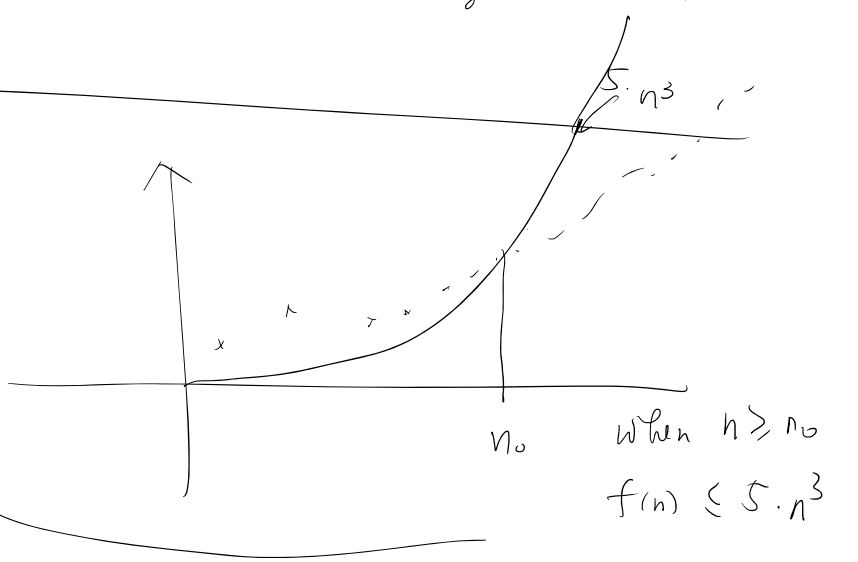
Edges $= \{\{A, C\}, \ldots\}$

$\{A, C\}$ = an edge

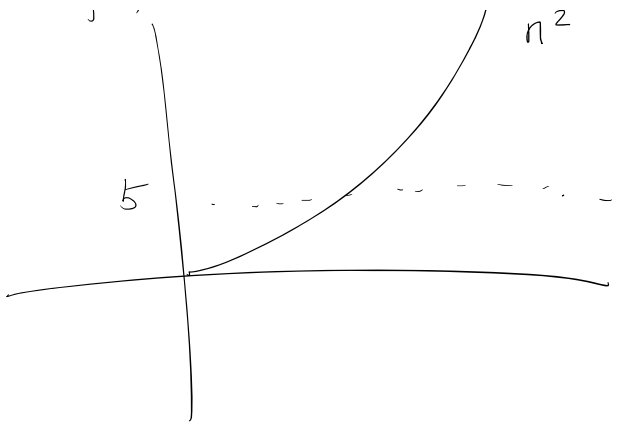
remaining edges

$f(n) = O(n^3)$

upper bound



$f(n)$ n^2

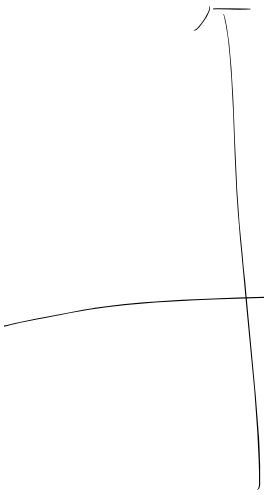


$f(n) = O(n^2)$

$100 + \text{worst case} \leq 100 + 5n^2$

$\leq 6n^2$

when $n \geq \ldots$



when n is large enough

Bubble Sort worst case : $O(n^2)$

```
for (~ n steps) {
    for (~ n steps) {
        } Constant amount of work
    }
```

input . 2^n step . $O(n)$

k step $O(\lg_2 k)$