$8 = 5 + 3$

$9 = 3 + 3 + 3$

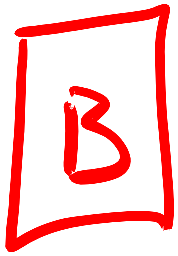
$10 = 5 + 5$

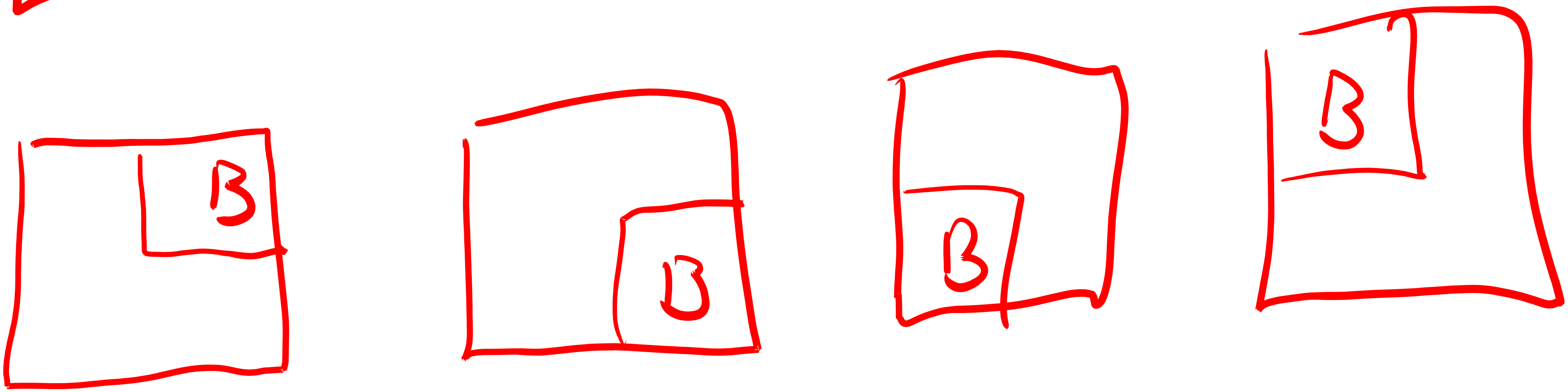
$11 = 3 +$ chang for 8

$12 = 3 +$ ch for 9

$\vdots$

$n = 3$ ch fr $(n-3)$


B


B
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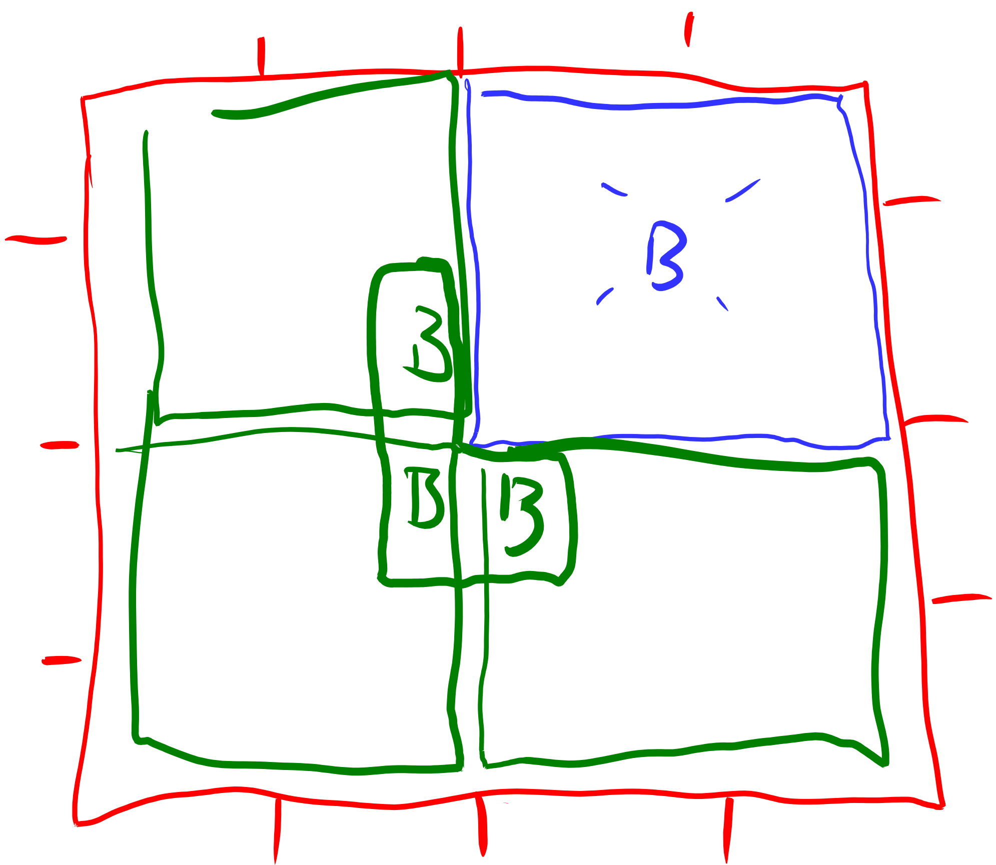
B
B
B
B

$P(n) =$ ...

Proof: induction

thing that does not change

thing true of each size

inductive hypothesis

Base Case: all the needed smallest examples

Inductive Step: assume $\underbrace{\text{ind. hyp}}$ is true for n.

proof of ind. hyp for $n+1$

by induction, $\underbrace{\text{ind. hyp}}$ holds for all natural numbers n

return x+y

```
add ( x , y )
1.   a = x
2.   b = y
3.   while ( a != 0 )
4.       a -= 1
5.       b += 1
6.   return b
```

assum $x \geq 0$, x is an integer

base code ⊢ $a+b = x+y$

$\boxed{a+b = x+y}$

loop invariant

ind. hypoth

inductive step

Prove

$a = 0$

assum start line 4 with $a+b = x+y$

end line 5 with $a+b = x+y-1+1 = x+y$

This code $\boxed{\text{stops}}$ ← his return

induction $\boxed{\text{stops}(x)}$

base: $x=0$, stops because code

inductive:

← assum $\boxed{\text{stops}(n)}$

stopping is due by a.

$x = n+1$, a is one larger than if $x = n$.

after line 4 runs once, $a = n$. when $a = n$, we stop.

b/cs stop(n)!

∴ $\boxed{\text{stop}(n+1)}$

to prove X by

Contradiction

assum $\neg X$

$\therefore \bot$

Induction

show X for small values

assum X

$\therefore X$ for biger values

Use to show $\nexists$

you can't

there isn't

$\vdots$

$\forall$

$\mathbb{N}$, countable

$0\ (1, 2)$

$n \rightarrow n+1$

$0, 1 \ldots n \rightarrow n+1$