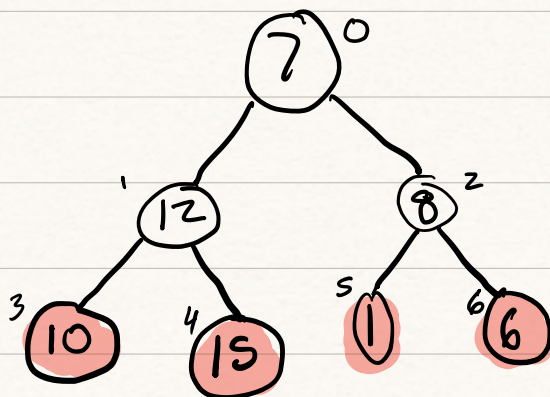


# Part a:

start

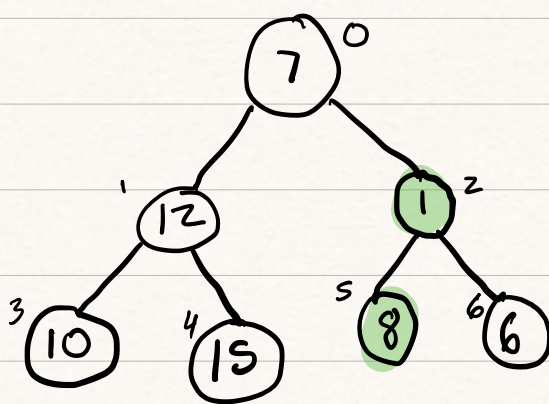
valid heaps



heapify (2)

swap

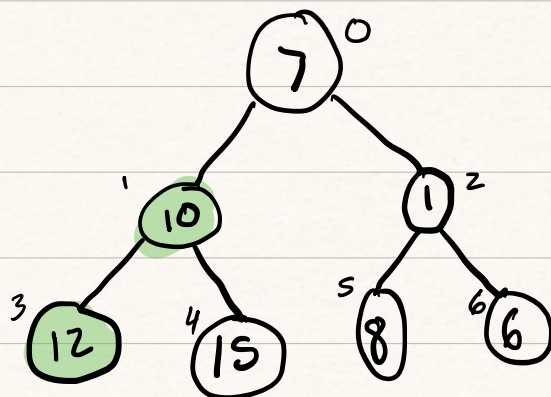
$1 \leftrightarrow 8$



heapify (1)

swap

$10 \leftrightarrow 12$

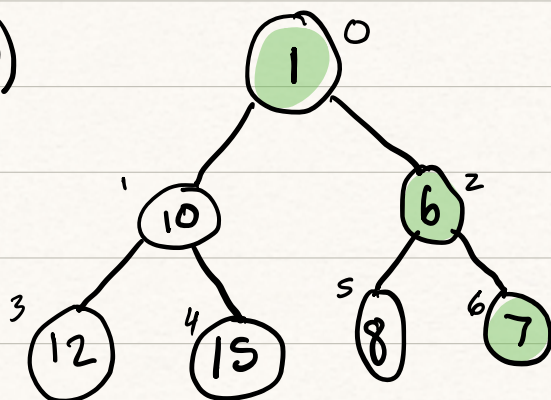


heapify (0)

swap

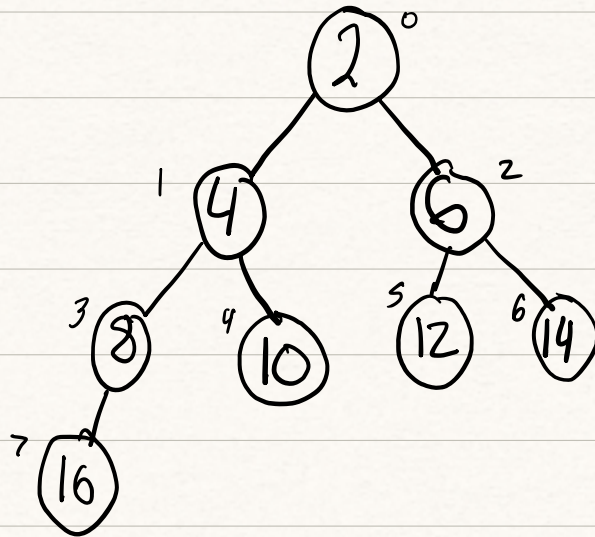
$1 \leftrightarrow 7$

$6 \leftrightarrow 7$

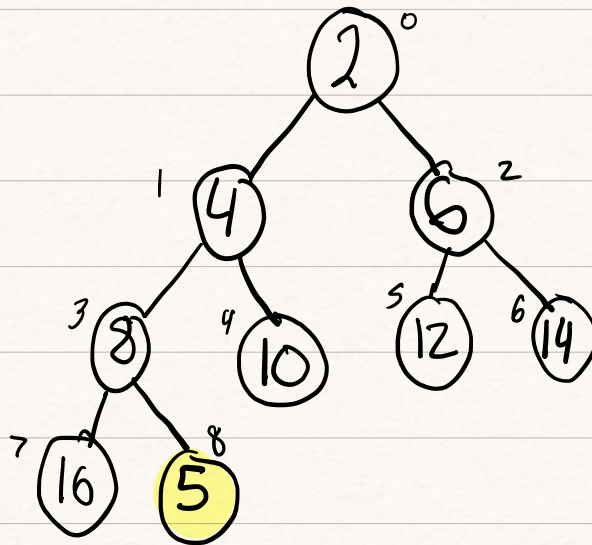


# Part B:

initial config

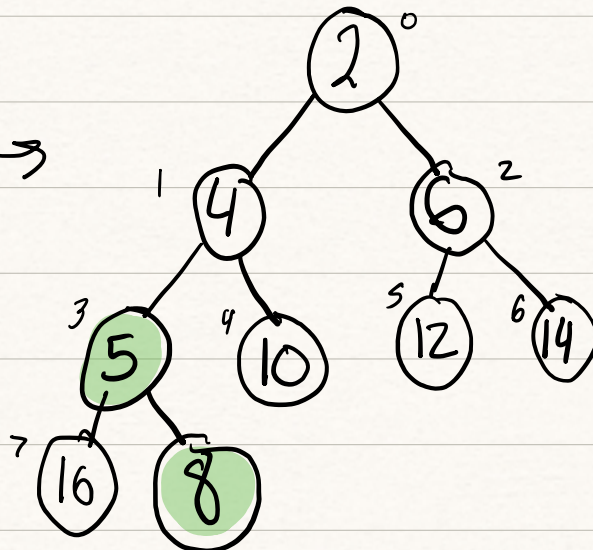


insert 5



$5 \leftrightarrow 8$

final  $\rightarrow$

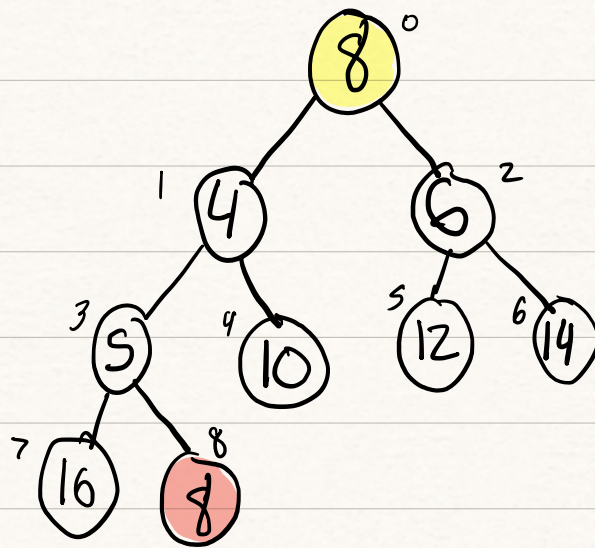




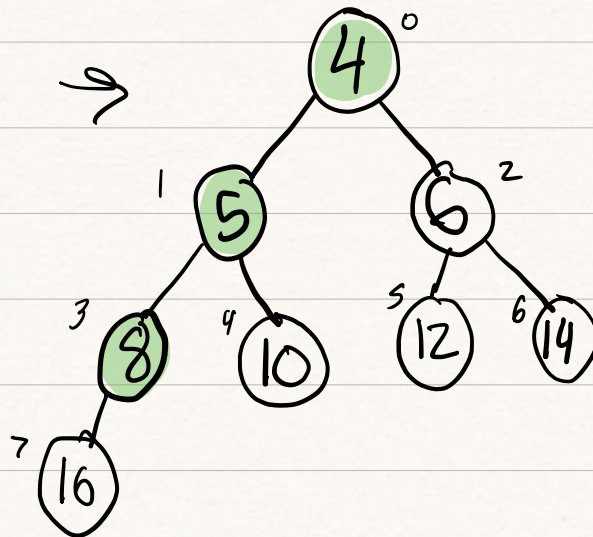
pop (top element)

$4 \leftrightarrow 8$

$5 \leftrightarrow 8$



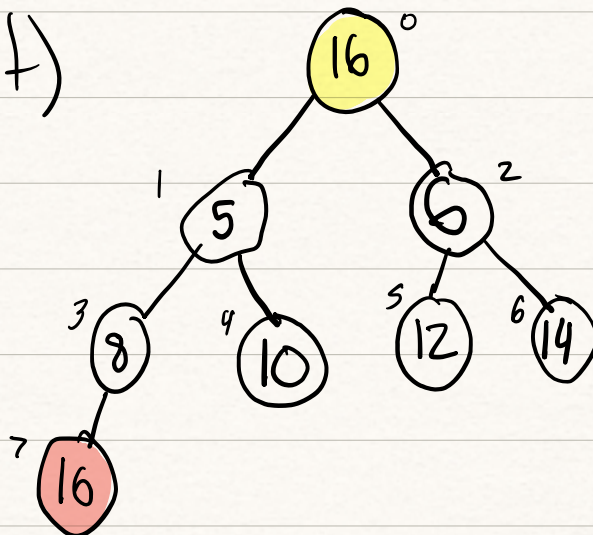
final  $\rightarrow$



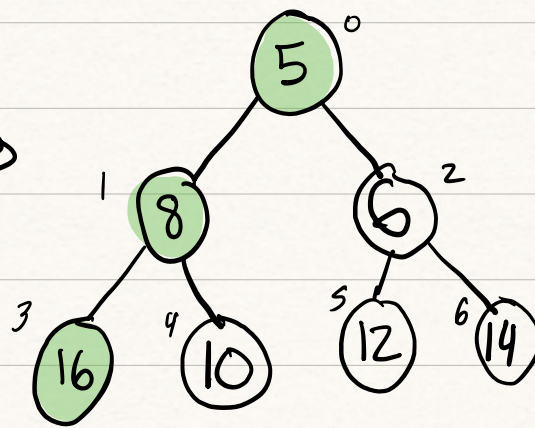
pop (top element)

$5 \leftrightarrow 16$

$8 \leftrightarrow 16$



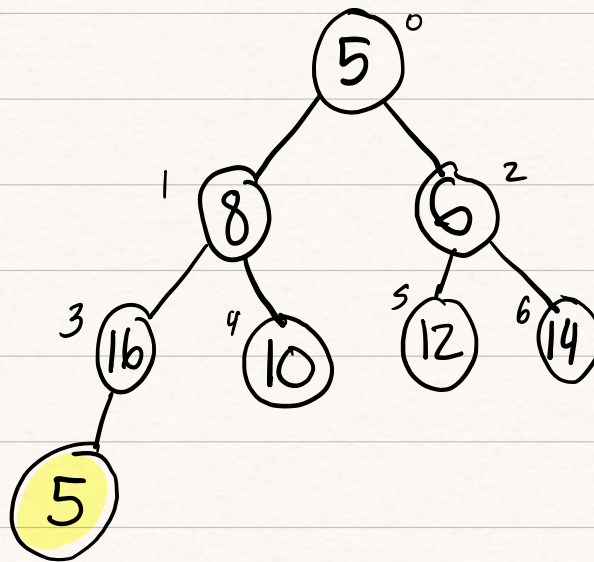
final  $\rightarrow$



insert 5

$5 \leftrightarrow 16$

$5 \leftrightarrow 8$



final  $\rightarrow$

