ARN CNS CPT BWI MEX ADD PVG POS BNE EZE

ARN → ARN ARN
CNS
CPT

CNS
ARN   CPT
BWI

MEX ADD PVG POS BNE EZE BQN

CNS
ARN   CPT
BWI

CNS
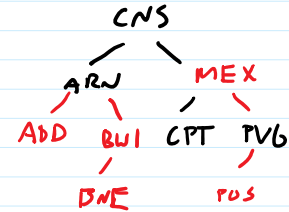ARN   CPT
ADD BWI MEX
PVG

CNS
ARN   MEX
ADD BWI CPT PVG
POS

CNS
ARN   MEX
ADD BWI CPT PVG
BNE   POS

CNS
ARN   MEX
ADD BWI CPT PVG
BNE   EZE POS
BQN

CNS
ARN   MEX
ADD BWI CPT PVG
BQN   EZE POS
BNE

CNS
ARN   MEX
ADD BQN CPT PVG
BNE BWI EZE POS
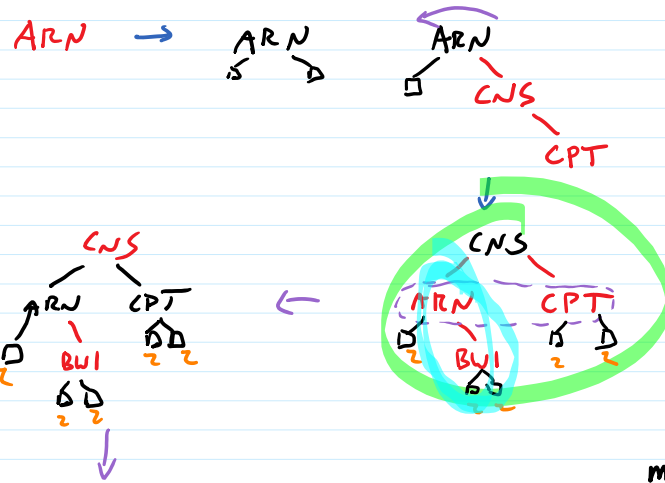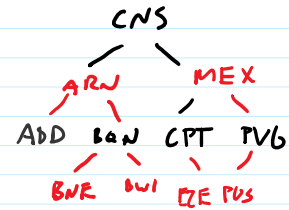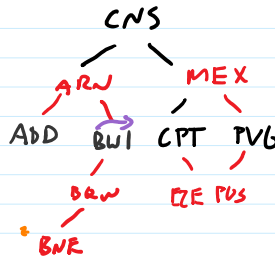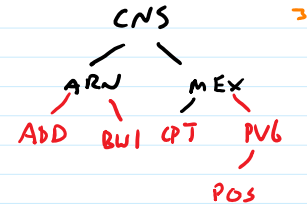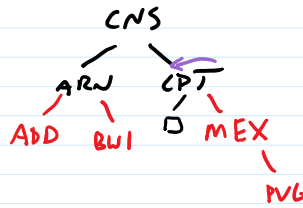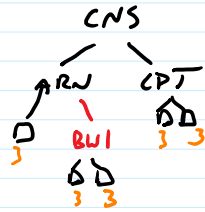
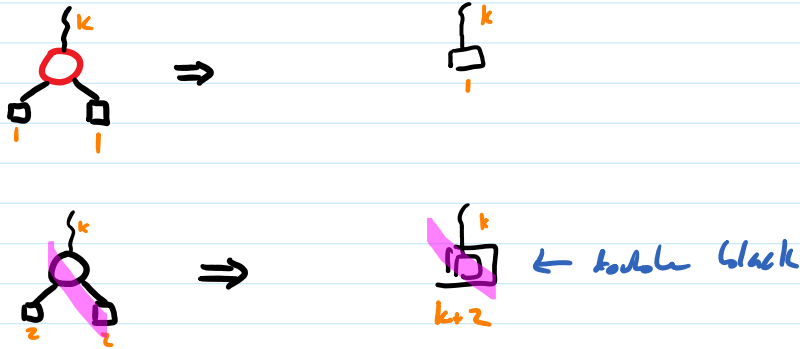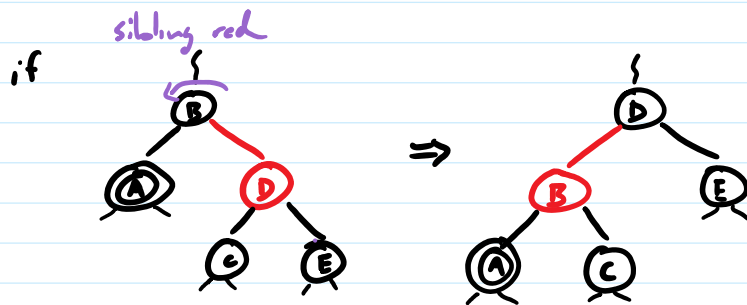Do normal BST delete; if deleted node has non-leaf child
find replacement
replacement node takes deleted node's color
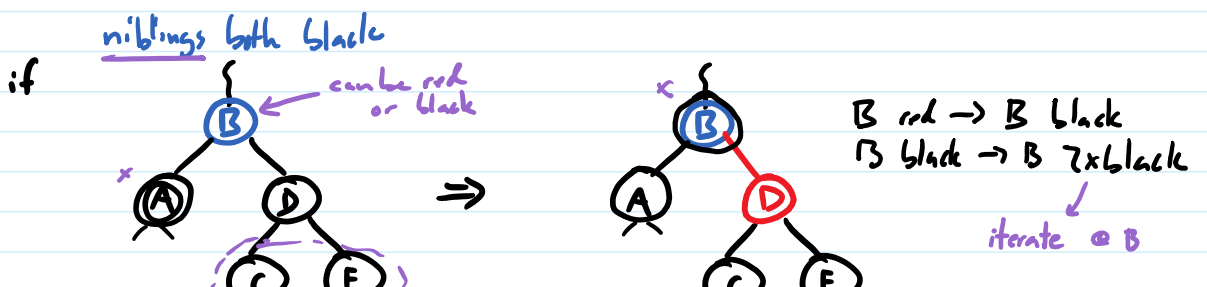do delete at old location of replacement
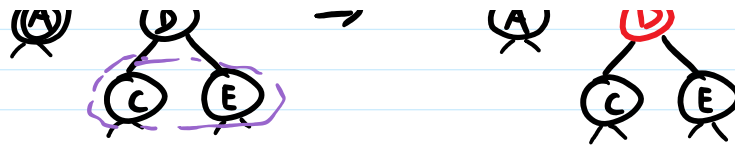
Both children are leaves

⇐ double black

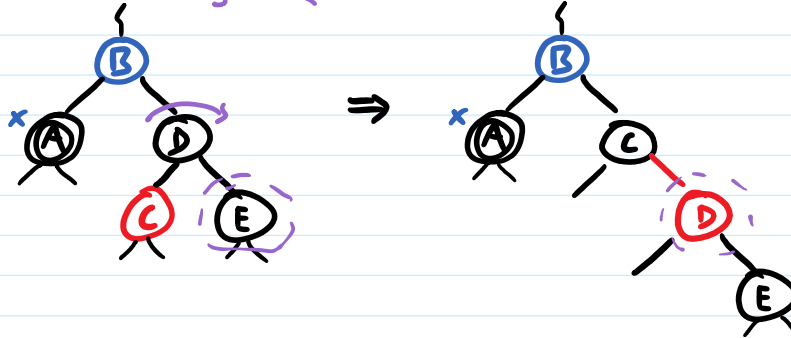while x is doubly black

root black

if   ⇒

sibling red

if ⇒

now sibling is black...
fall through to subsequent case

niblings both black

if ⇒

can be red
or black

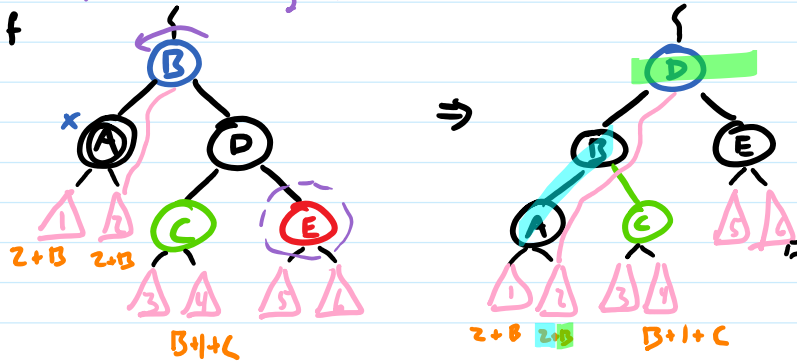B red → B black
B black → B 2×black

iterate @ B

iterate @ B

else if   furthest nibling black
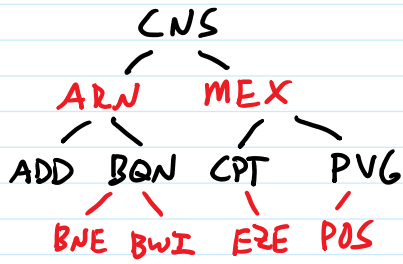

now furthest nibling
is red... fall through
to next case

if   furthest nibling red

2+B   2+B
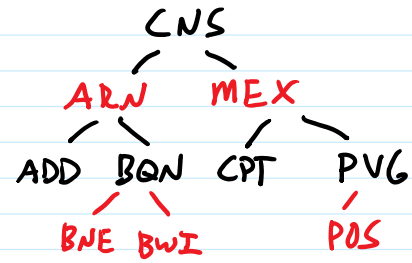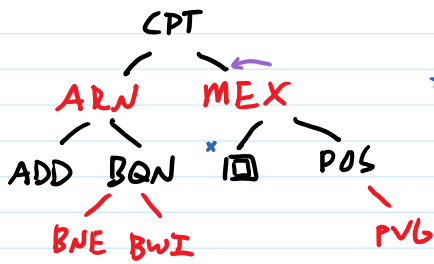
B+1+C

⇒

DONE

B red or black
C red or black

2+B 2+B   B+1+C

CNS
ARN   MEX
ADD BQN CPT   PVG
BNE BWI EZE POS

(easy case —
red node w/ black
leaves as children)

CNS
ARN   MEX
ADD BQN CPT   PVG
BNE BWI   POS

delete CNS;
replace with CPT

CPT
ARN   MEX
ADD BQN ×□   POS
BNE BWI   PVG

sibling black +
furthest nibling black

CPT
ARN   MEX
ADD BQN ×□   PVG
BNE BWI   POS

sibling black
furthest nibling red

CPT
ARN   POS
ADD BQN MEX PVG
BNE BWI