

(Insert) //  $H \rightarrow$  heap,  $x \rightarrow$  key to be inserted.

• Binomial-Heap-Insert( $H, x$ )

$H_{new} = \text{MAKE-BINOMIAL-HEAP}()$

Parent $[x] = \text{NIL}$

Child $[x] = \text{NIL}$

Sibling $[x] = \text{NIL}$

Degree $[x] = 0$

head $[H_{new}] \leftarrow x$

$H \leftarrow \text{BINOMIAL-HEAP-UNION}(H, H_{new})$

(Union)

• Binomial-Heap-Union( $y, z$ )

//  $y$  &  $z \rightarrow$  Binomial heaps with same degree

Parent $[y] = z$

Sibling $[y] = \text{Child}[z]$

Child $[z] = y$

Degree $[z] = \text{Degree}[z] + 1$

(Get Minimum)

Binomial-Heap-Minimum( $H$ )

//  $H \rightarrow$  heap of heap.

$y = \text{NIL}$

$x = \text{head}[H]$

min =  $\infty$



while ( $x \neq \text{NIL}$ )

do if  $\text{key}[x] < \text{min}$

then  $\text{min} = \text{key}[x]$

$y = x$

$x = \text{sibling}[x]$

return  $y$ .

(Extract min)

Binomial-Heap-Extract-Min( $H$ )

//  $H \rightarrow$  head of heap.

$x = \text{Binomial-Heap-Minimum}(H)$

// Remove  $x$  from  $H$

$\text{temp} = H$

~~while~~  $H_{\text{new}} = \text{MAKE-BINOMIAL-HEAPS}$

while ( $\text{temp}$ )

if ( $\text{temp} \neq x$ )

do  ~~$H_{\text{new}}$~~  Insert( $H_{\text{new}}, \text{temp}$ )

$\text{temp} = \text{sibling}[\text{temp}]$

// Remove min from  $\text{temp}$

$H_{\text{new}2} = \text{NULL}$

$\text{temp} = x \rightarrow \text{child}$

$\text{lo} = \text{NULL}$

while ( $\text{temp}$ )

do

$\text{lo} = \text{temp}$

$\text{temp} = \text{temp}[\text{sibling}]$

$\text{lo} \rightarrow \text{sibling} = \text{NULL}$



insert (Hnew2, 10)

tmp = tmp-sibling

return Hnew2.