

# RB-INSERT-FIXUP( $T, z$ )

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1  while  $z.p.color == RED$ 
2      if  $z.p == z.p.p.left$                                 // is  $z$ 's parent a left child?
3           $y = z.p.p.right$                                 //  $y$  is  $z$ 's uncle
4          if  $y.color == RED$                                 // are  $z$ 's parent and uncle both red?
5               $z.p.color = BLACK$ 
6               $y.color = BLACK$ 
7               $z.p.p.color = RED$ 
8               $z = z.p.p$ 
9          else
10             if  $z == z.p.right$ 
11                  $z = z.p$ 
12                 LEFT-ROTATE( $T, z$ )
13              $z.p.color = BLACK$ 
14              $z.p.p.color = RED$ 
15             RIGHT-ROTATE( $T, z.p.p$ )
16 else // same as lines 3–15, but with “right” and “left” exchanged
17      $y = z.p.p.left$ 
18     if  $y.color == RED$ 
19          $z.p.color = BLACK$ 
20          $y.color = BLACK$ 
21          $z.p.p.color = RED$ 
22          $z = z.p.p$ 
23     else
24         if  $z == z.p.left$ 
25              $z = z.p$ 
26             RIGHT-ROTATE( $T, z$ )
27          $z.p.color = BLACK$ 
28          $z.p.p.color = RED$ 
29         LEFT-ROTATE( $T, z.p.p$ )
30  $T.root.color = BLACK$ 

```