

```

void RB_DELETE_FIXUP(BST **T ,BST *x)
{BST *w;
  while ((x != *T) && (x->color == cBLACK))
  {
    if (x == (x->parent)->left)
    {
      w = (x->parent)->right;
      if(w->color == cRED)
      {
        w->color = cBLACK;           // Case 1
        (x->parent)->color = cRED;    // Case 1
        LEFT_ROTATE(T, x->parent);   // Case 1
        w = (x->parent)->right;      // Case 1
      }
      if (((w->left)->color == cBLACK) && ((w->right)->color == cBLACK))
      {
        w->color = cRED ;           // Case 2
        x = x->parent;              // Case 2
      }
      else
      {
        if ((w->right)->color == cBLACK)
        {
          (w->left)->color = cBLACK ; // Case 3
          w->color = cRED;            // Case 3
          RIGHT_ROTATE(T, w) ;      // Case 3
          w = (x->parent)->right;    // Case 3
        }
        w->color = (x->parent)->color; // Case 4
        (x->parent)->color = cBLACK ; // Case 4
        (w->right)->color = cBLACK ; // Case 4
        LEFT_ROTATE(T, x->parent);   // Case 4
        x = *T ;                    // Case 4
      }
    }
  }
  else //(same as then clause with "right" and "left" exchanged)
  {
    w = (x->parent)->right;
    if(w->color == cRED)
    {
      w->color = cBLACK;           // Case 1
      (x->parent)->color = cRED;    // Case 1
      RIGHT_ROTATE(T, x->parent);   // Case 1
      w = (x->parent)->left;        // Case 1
    }
    if (((w->right)->color == cBLACK) && ((w->left)->color == cBLACK))
    {
      w->color = cRED ;           // Case 2
      x = x->parent;              // Case 2
    }
  }
}

```

```

else
{
    if ((w->left)->color== cBLACK)
    {
        (w->right)->color =cBLACK ;    // Case 3
        w->color=cRED;                  // Case 3
        LEFT_ROTATE(T, w) ;            // Case 3
        w= ( x->parent)->left;          // Case 3
    }
    w->color = ( x->parent)->color;      // Case 4
    (x->parent)->color=cBLACK ;          // Case 4
    (w->left)->color =cBLACK ;          // Case 4
    RIGHT_ROTATE(T, x->parent);         // Case 4
    x =*T ;                            // Case 4
}
}
} // end while
x->color= cBLACK;
} // RB_DELETE_FIXUP

```