RB-INSERT-FIXUP(T, z)

    while $z.p.color ==$ RED
        if $z.p == z.p.p.left$
            $y = z.p.p.right$
            if $y.color ==$ RED
                $z.p.color =$ BLACK   **//** case 1
                $y.color =$ BLACK   **//** case 1
                $z.p.p.color =$ RED   **//** case 1
                $z = z.p.p$ **//** case 1
            else if $z == z.p.right$
                $z = z.p$ **//** case 2
                LEFT-ROTATE(T, z)   **//** case 2
            $z.p.color =$ BLACK   **//** case 3
            $z.p.p.color =$ RED   **//** case 3
            RIGHT-ROTATE($T, z.p.p$)   **//** case 3
        else (same as **then** clause with "right" and "left" exchanged)
    $T.root.color =$ BLACK