LEAN Project Circle

1 Content in file CCPosition.lean

In this file, we define the relative positions between circles. Definitions:
(defn) separated$_o f_c ircle_c ircle : Prop--Giventwocircles(\omega_1\omega_2 : CircleP), returnapropositionth$
$r_1 + r_2.(defn)intersected_o f_c ircle_c ircle : Prop - -Giventwocircles(\omega_1\omega_2 :$
$CircleP), returnapropositionthatthedistancebetweentwocirclecentersislessthanthesumoftwor$
$r_2| < |O_1O_2| < r_1+r_2.(defn)circumscribed_o f_c ircl_c ircle : Prop--Giventwocircles(\omega_1\omega_2 :$
$CircleP), returnapropositionthatthedistancebetweentwocirclecentersisequaltothesumoftwora$
$r_1+r_2.(defn)included_o f_c ircle_c ircle : Prop--Giventwocircles(\omega_1\omega_2 : CircleP), returnapropositi$
$r_1-r_2.(defn)inscribed_o f_c ircle_c ircle : Prop--Giventwocircles(\omega_1\omega_2 : CircleP), returnapropositi$
$r_1 - r_2.$

Theorems : separated$_c ircles_z ero_i ntersection - -Giventwocircles(\omega_1\omega_2 :$
$CircleP), if theyareseparated, thentheyhavenointersection.intersected_c ircles_t wo_i ntersection-$
$-Giventwocircles(\omega_1\omega_2 : CircleP), if theyintersecteachother, thentheyhaveexactlytwocommon$
$-Giventwocircles(\omega_1\omega_2 : CircleP), if theyarecircumscribed, thentheyhaveexactlyonecommonpo$
$-Giventwocircles(\omega_1\omega_2 : CircleP), if\omega_2 isincludedin\omega_1, thentheyhavenointersections.inscibed_c$
$-Giventwocircles(\omega_1\omega_2 : CircleP), if\omega_1 isinscribedwith\omega_2, thentheyhaveexactlyonecommonpoi$

2 Content in file LCPosition.lean

In this file, we define the relative position between lines and circles and rays and circles. What's more, when discuss position bewteen rays and circles, we want give a criterion whether the underlying lines have common points with the circles and give constructions to the TWO intersections (may be the same point).

2.1 position of lines and circles

Definitions : (defn) line$_t angent_t o_c ircle : Prop--Givenalineandacircle, returnapropositionthatt$
$Prop--Givenalineandacircle, returnapropositionthattheyhaveexactlytwocommonpoints.(defn$
$Prop--Givenalineandacircle, returenapropositionthattheyhavenocommonpoints.(defn)line_i n$

$Prop--Givenalineandacircle, returnapropositionthatthelinehasatleastacommonpointwiththe$
$line_tangent_tocircle_iff_one_intersection--Givenalineandacircle, thelineistangenttothecircleiff$
$-Givenalineandacircle, thelineissecanttothecircleiff thedistancefromthecentertothelineisless$
$-Givenalineandacircle, thelineisdisjointfromthecircleiff thedistancefromthecentertotheline$