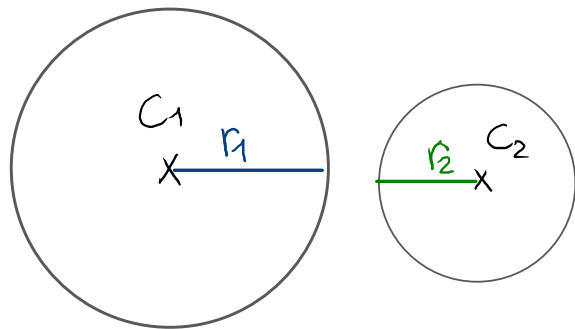


# Position relative

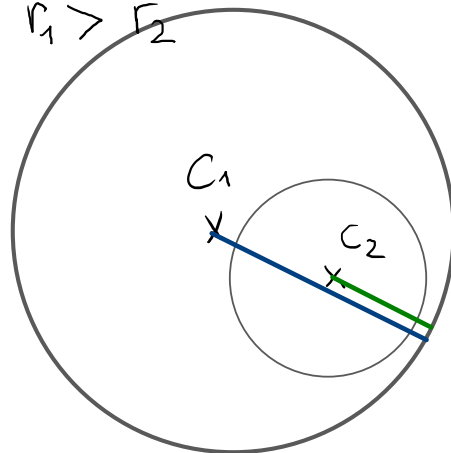
## Cercle - cercle

Soit  $\gamma_1$  et  $\gamma_2$  deux cercles de centre  $C_1, C_2$  et de rayon  $r_1, r_2$  avec  $r_1 > r_2$

Disjoints  
aucun  $\cap$

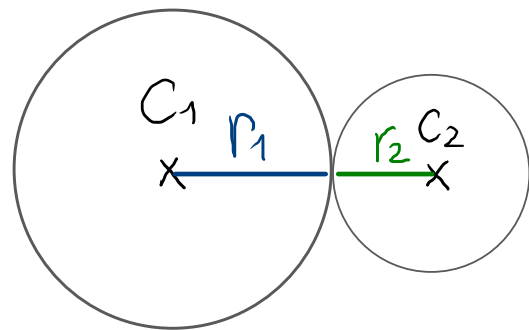


$$\| \vec{C_1 C_2} \| > r_1 + r_2$$

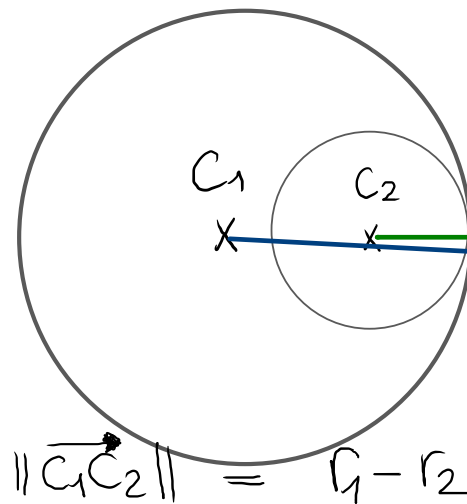


$$\| \vec{C_1 C_2} \| < r_1 - r_2$$

Tangents  
1 pt d' $\cap$

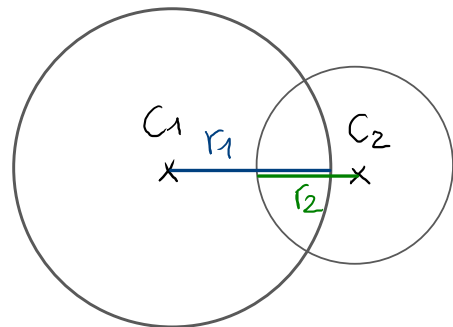


$$\delta(C_1, C_2) = r_1 + r_2 = \| \vec{C_1 C_2} \|^2$$



$$\| \vec{C_1 C_2} \| = r_1 - r_2$$

Sécants  
2 pts d' $\cap$



$$r_1 - r_2 < \| \vec{C_1 C_2} \| < r_1 + r_2$$

Exemple

$$\gamma_1: x^2 + y^2 = 25$$

$$C_1(0;0) \quad r_1 = 5$$

$$\gamma_2: (x-14)^2 + (y-2)^2 = 125$$

$$C_2(14;2) \quad r_2 = \sqrt{125} = 5\sqrt{5}$$

a) position relation de  $\gamma_1$  et  $\gamma_2$

$$\vec{C_1C_2} = \begin{pmatrix} 14 \\ 2 \end{pmatrix} - \begin{pmatrix} 0 \\ 0 \end{pmatrix} = \begin{pmatrix} 14 \\ 2 \end{pmatrix} \Rightarrow \|\vec{C_1C_2}\| = \sqrt{14^2 + 2^2} = \sqrt{200} = 10\sqrt{2} \cong 14,14$$

$$r_1 + r_2 \cong 16,18$$

$$r_2 - r_1 \cong 6,18$$

$\Rightarrow$  sécants car  $6,18 < 14,14 < 16,18$

b) points d'I

$$\begin{cases} x^2 + y^2 = 25 \\ (x-14)^2 + (y-2)^2 = 125 \end{cases}$$

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1<sup>e</sup>: équation générale (développée) des cercles

$$\Leftrightarrow \begin{cases} x^2 + y^2 = 25 \\ x^2 - 28x + 196 + y^2 - 4y + 4 = 125 \end{cases}$$

$$\Leftrightarrow \begin{cases} x^2 + y^2 = 25 \\ x^2 + y^2 - 28x - 4y = -75 \end{cases}$$

2<sup>e</sup>: soustraire une équation de l'autre

$$28x + 4y = 100 \quad | :4$$

$$7x + y = 25$$

3<sup>e</sup>: substitution :  $y = -7x + 25$

dans 1<sup>er</sup> cercle  
 $\Rightarrow$   
(à chax)

$$x^2 + (-7x + 25)^2 = 25$$

$$x^2 + 49x^2 - 350x + 625 = 25$$

$$50x^2 - 350x + 600 = 0$$

$$x^2 - 7x + 12 = 0$$

$$(x-3)(x-4) = 0$$

$$\Rightarrow x = \begin{cases} 3 \\ 4 \end{cases} \Rightarrow \begin{cases} y = -7 \cdot 3 + 25 = 4 \\ y = -7 \cdot 4 + 25 = -3 \end{cases} \Rightarrow \begin{cases} I(3;4) \\ J(4;-3) \end{cases}$$

