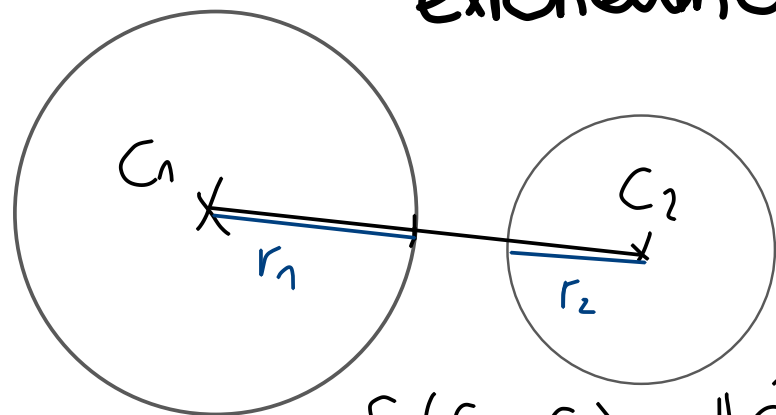


Position relative : cercle - cercle

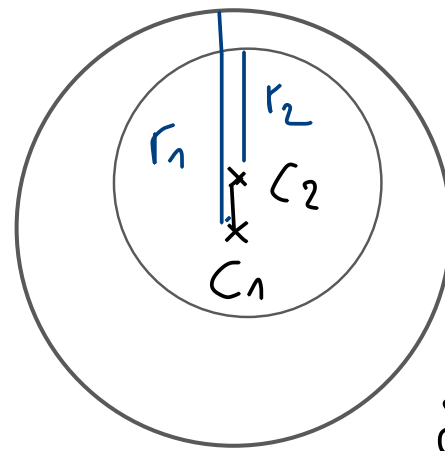
Soit γ_1 et γ_2 deux cercles de centre C_1 et C_2 et de rayon r_1 et r_2 avec $r_1 \geq r_2$

disjoints



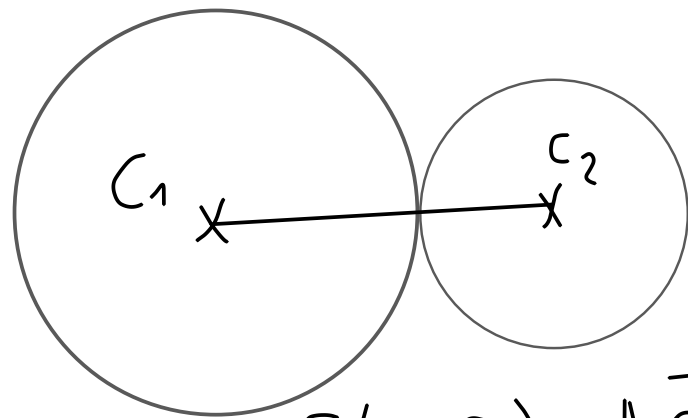
$$\delta(C_1, C_2) = \|\overline{C_1 C_2}\| > r_1 + r_2$$

intérieurement

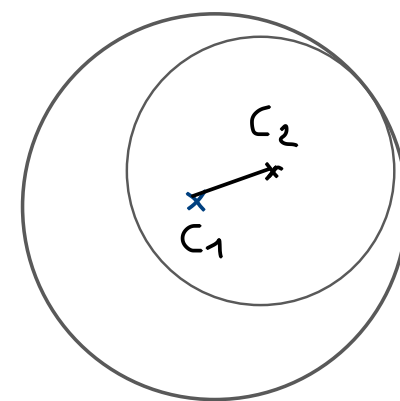


$$\delta(C_1, C_2) = \|\overline{C_1 C_2}\| < r_1 - r_2$$

tangents

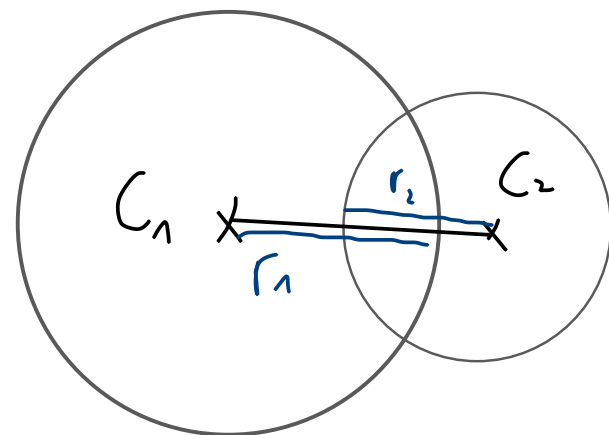


$$\delta(C_1, C_2) = \|\overline{C_1 C_2}\| = r_1 + r_2$$



$$\delta(C_1, C_2) = \|\overline{C_1 C_2}\| = r_1 - r_2$$

sécants



$$r_1 - r_2 < \delta(C_1, C_2) = \|\overline{C_1 C_2}\| < r_1 + r_2$$

Exemple

$$f_1: x^2 + y^2 = 25 \quad \text{et} \quad f_2: (x-14)^2 + (y-2)^2 = 125$$

$C_1(0;0)$ $C_2(14;2)$ $r_2 = \sqrt{125} = 5\sqrt{5} \cong 11.18$
 $r_1 = 5$ $\cong 11.18$

a) position relative?

$$\delta(C_1, C_2) = \| \overrightarrow{C_1 C_2} \| = \left\| \begin{pmatrix} 14-0 \\ 2-0 \end{pmatrix} \right\| = \sqrt{14^2 + 2^2} = \sqrt{200} = 10\sqrt{2} \cong 14.14...$$

$$r_1 + r_2 \cong 5 + 11.18 = 16.8 > \delta(C_1, C_2) > r_2 - r_1 \cong 11.18 - 5 = 6.18 \quad \underline{\text{sécants}}$$

b) pts d'intersection :

$$\begin{cases} x^2 + y^2 = 25 \\ (x-14)^2 + (y-2)^2 = 125 \end{cases} \Leftrightarrow \begin{cases} (1) \quad x^2 + y^2 = 25 \\ (2) \quad x^2 + y^2 - 28x - 4y = -75 \end{cases} \begin{array}{l} | \\ | \\ -1 \end{array}$$

$$\Rightarrow \begin{array}{r} x^2 + y^2 = 25 \\ -x^2 - y^2 + 28x + 4y = 75 \\ \hline 28x + 4y = 100 \end{array}$$

a) on se débarrasse de x^2 et y^2

$$\begin{aligned} (3) \quad &\Leftrightarrow 7x + y = 25 \\ &\Leftrightarrow y = -7x + 25 \end{aligned}$$

b) on isole x ou y

dans (1)

$$\begin{aligned} \Rightarrow x^2 + (-7x + 25)^2 &= 25 \\ x^2 + 49x^2 - 350x + 625 &= 25 \\ 50x^2 - 350x + 600 &= 0 \\ 5x^2 - 35x + 60 &= 0 \\ x^2 - 7x + 12 &= 0 \\ (x-3)(x-4) &= 0 \end{aligned}$$

c) on substitue dans l'équation (1) ou (2)

$$\Rightarrow \begin{cases} x=3 & \stackrel{(3)}{\Rightarrow} y = -7 \cdot 3 + 25 = 4 & \Rightarrow I_1(3;4) \\ x=4 & \stackrel{(3)}{\Rightarrow} y = -7 \cdot 4 + 25 = -3 & \Rightarrow I_2(4;-3) \end{cases}$$

