## Redução de cônicas

Reduzir a cônica

$$\frac{x}{2}-\frac{x}{\sqrt{3}}+\frac{7\,x^2}{48}-\frac{y}{3}-\frac{\sqrt{3}\,y}{2}-\frac{5\,x\,y}{24\sqrt{3}}+\frac{31\,y^2}{144}=-1$$

à forma canônica, achar vertizes e centro.

**Res**

$$\begin{array}{c|c|c}\widetilde{A}=\dfrac{7}{48} & \widetilde{B}=-\dfrac{5}{24\sqrt{3}} & \widetilde{C}=\dfrac{31}{144}\\ \hline \widetilde{A}=\dfrac{21}{144} & \widetilde{B}=-\dfrac{10\sqrt{3}}{144} & \widetilde{C}=\dfrac{31}{144}\end{array}$$

$$\boxed{\tan\alpha=\frac{\widetilde{C}-\widetilde{A}\pm\sqrt{(\widetilde{C}-\widetilde{A})^2+\widetilde{B}^2}}{\widetilde{B}}\quad\Rightarrow\quad \tan\alpha=\frac{10\pm\sqrt{100+300}}{-10\sqrt{3}}=\begin{cases}-\sqrt{3}\\ \dfrac{1}{\sqrt{3}}\end{cases}\quad\text{↬}\quad\frac{1}{\sqrt{3}}}$$

$$\boxed{\sin\alpha=\frac{\tan\alpha}{\sqrt{1+\tan^2\alpha}}=\frac{1}{2}\quad\bullet\quad\cos\alpha=\frac{1}{\sqrt{1+\tan^2\alpha}}=\frac{\sqrt{3}}{2}}$$

$$\boxed{x=X\,\cos\alpha-Y\,\sin\alpha=\frac{X\sqrt{3}-Y}{2}\quad\bullet\quad y=X\,\sin\alpha+Y\,\cos\alpha=\frac{X+Y\sqrt{3}}{2}}$$

$$\Downarrow$$

$$\frac{1}{9}X^2-\frac{2}{3}X+\frac{1}{4}Y^2-Y=-1$$

$$\Downarrow$$

$$\boxed{\frac{(X-3)^2}{9}+\frac{(Y-2)^2}{4}=1}$$

$$\Downarrow$$

| | $(X,Y)$ | $(x,y)$ |
|---|---|---|
| $C$ | $(3,2)$ | $\left(-1+\frac{3\sqrt{3}}{2},\frac{3}{2}+\sqrt{3}\right)$ |
| $V_1$ | $(0,2)$ | $\left(-1,\sqrt{3}\right)$ |
| $V_2$ | $(6,2)$ | $\left(-1+3\sqrt{3},3+\sqrt{3}\right)$ |
| $V_3$ | $(3,0)$ | $\left(\frac{3\sqrt{3}}{2},\frac{3}{2}\right)$ |
| $V_4$ | $(3,4)$ | $\left(-2+\frac{3\sqrt{3}}{2},\frac{3}{2}+2\sqrt{3}\right)$ |