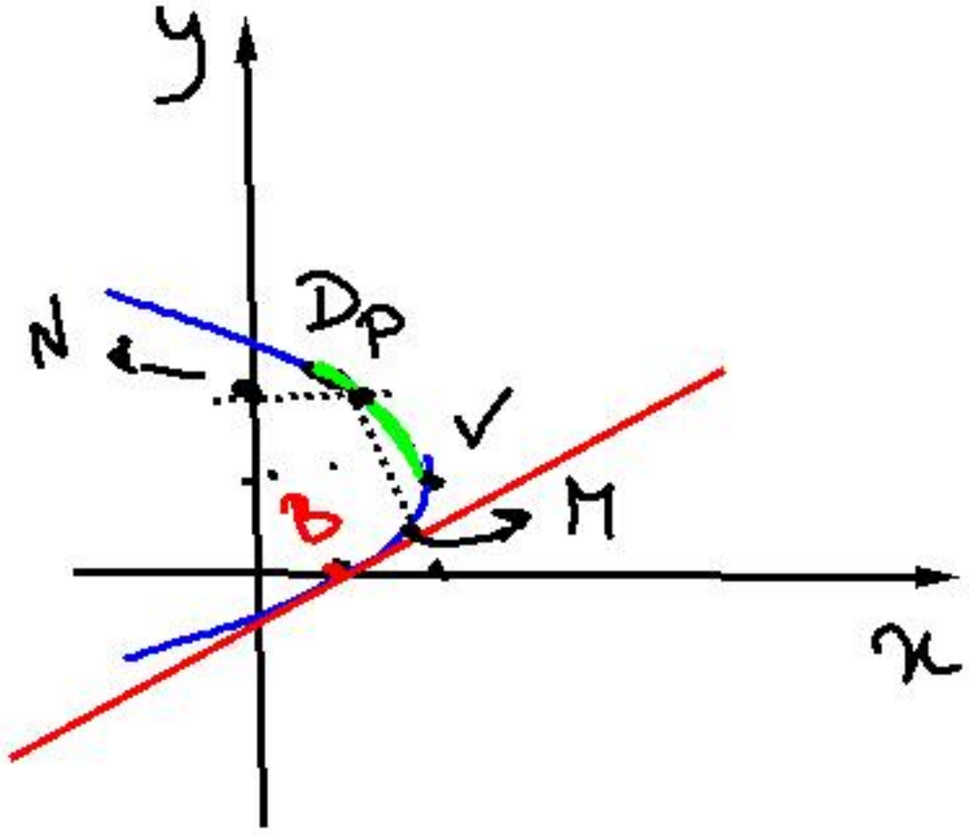
Q2)

$$ax^2+fx+ey^2+gy+h=0$$

$$a\left(x^2+\frac{f}{a}x+\frac{f^2}{4a^2}\right)-\frac{f^2}{4a^2}$$

$$e\left(y^2+\frac{g}{e}y+\frac{g^2}{4e^2}\right)-\frac{g^2}{4e^2}$$

$$a\left(x+\frac{f}{2a}\right)^2+e\left(y+\frac{g}{2e}\right)^2=\frac{f^2}{4a^2}+\frac{g^2}{4e^2}-h$$



$y = \frac{1}{2}x - \frac{1}{2}$ $\quad P \in \gamma$

$x = -y^2 + 2y + 1$

$D(1, 2)$ $\qquad \underline{x - 2y - 1 = 0}$

$P(-y^2+2y+1, y)$

$y \in [1, 2]$

$\overline{PN} = -y^2 + 2y + 1$

$$\overline{PM} = \frac{|-y^2+2y+1-2y-1|}{\sqrt{5}} = \frac{|1-y^2|}{\sqrt{5}} = \frac{y^2}{\sqrt{5}}$$

$$k\overline{PN} + \sqrt{5}\,\overline{PM} = 3k \rightarrow k(-y^2+2y+1) + y^2 = 3k$$

$$k(-y^2+2y+1)+y^2=3k$$

$$\begin{cases} y^2(1-k)+2ky-2k=0 \\ 1\leq y\leq 2 \end{cases} \longrightarrow \begin{cases} x=y^2 \\ x(1-k)+2ky-2k=0 \\ 1\leq y\leq 2 \end{cases}$$

$$\begin{cases} x=0 \\ -x+2y-2=0 \end{cases}$$

$C(0,1)$