(1) $\binom{n}{i} t^i (1-t)^{n-i}$ $\quad n=2 \quad \binom{2}{i} t^i (1-t)^{2-i}$

$V_0[-1,0]$ $V_1[2,1]$ $V_2[4,-1]$

$w_0=1$ $w_1=1$ $w_2=2$

$V_0^w \binom{2}{0} t^0 (1-t)^2 + V_1^w \binom{2}{1} t(1-t) + V_2^w \binom{2}{2} t^2 (1-t)^0$

$r^w(t) = V_0^w (1-t)^2 + V_1^w t(1-t) + V_2^w t^2$

$V_i^w = [V_i^x, V_i^y, w_i]$ | $V_0^w[-1\cdot 1, 0\cdot 1, 1]$; $V_1^w[2\cdot 1, 1\cdot 1, 1]$; $V_2^w[4\cdot 2, -1\cdot 2, 2]$

$$r^w(t) \begin{cases} -1(1-t)^2 + 2\cdot 2t(1-t) + 8t^2 = -t^2+2t-1+4t-4t^2+8t^2 = 3t^2+6t-1 \\ 0(1-t)^2 + 1\cdot 2t(1-t) + (-2)t^2 = 2t-2t^2-2t^2 = -4t^2+2t \\ 1(1-t)^2 + 1\cdot 2t(1-t) + 2t^2 = 1-2t+t^2+2t-2t^2+2t^2 = t^2+1 \end{cases}$$

$r(t) = \left[\frac{3t^2+6t-1}{t^2+1}, \frac{-4t^2+2t}{t^2+1}\right]$ $\quad r(0) = [-1/1, 0/1]$ $\quad r(1) = [8/2, -2/2]$

$r(1/2) = \left[\frac{3/4+3-1}{1/4+1}, \frac{-4\frac{1}{4}+2\cdot 1/2}{1/4+1}\right] = \left[\frac{11}{5}, 0\right]$

(2) $V_0[1,0]$, $V_1[1,1]$, $V_2[0,1]$ $\quad V_0^w[1,0,1]$ $V_1^w[1,1,1]$ $V_2^w[0,2,2]$

$w_0=1$ $w_1=1$ $w_2=2$

$$r^w(t) = \begin{cases} 1(1-t)^2 + 1\cdot 2t(1-t) + 0t^2 = 1-2t+t^2+2t-2t^2 = -t^2+1 \\ 0(1-t)^2 + 1\cdot 2t(1-t) + 2t^2 = 2t-2t^2+2t^2 = 2t \\ 1(1-t)^2 + 1\cdot 2t(1-t) + 2t^2 = 1-2t+t^2+2t-2t^2+2t^2 = t^2+1 \end{cases}$$

$r(t) = \left[\frac{-t^2+1}{t^2+1}, \frac{2t}{t^2+1}\right]$ $\quad r(0) = [1/1, 0/1]$ $\quad r(1) = [0/2, 2/2]$

$x = 1\cdot\cos(\varphi)$, $y = 1\cdot\sin(\varphi)$, $x^2+y^2=1$, $\frac{(-t^2+1)^2}{t^2+1} + \frac{(2t)^2}{t^2+1} = 1$ je kružnica

(4) $V_0[3,0]$ $V_1[0,0]$ $V_2[0,6]$ $\quad V_0^w[3w_0, 0, w_0]$ $V_1^w[0,0,w_1]$ $V_2^w[0, 6w_2, w_2]$

$w_0=?$ $w_1=?$ $w_2=?$

$r(1/2) = [1,1]$

$$r^w(t) \begin{cases} 3w_0(1-t)^2 + 0\cdot 2t(1-t) + 0t^2 = 3(1-t)^2 w_0 \\ 0(1-t)^2 + 0\cdot 2t(1-t) + 6w_2 t^2 = 6t^2 w_2 \\ w_0(1-t^2) + w_1\cdot 2t(1-t) + w_2 t^2 = (1-t)^2 w_0 + 2t(1-t)w_1 + t^2 w_2 \end{cases}$$

$r(t) = \frac{3(1-t)^2 w_0}{(1-t)^2 w_0 + 2t(1-t)w_1 + t^2 w_2}, \frac{6t^2 w_2}{(1-t)^2 w_0 + 2t(1-t)w_1 + t^2 w_2}$; $r(1/2) = \left[\frac{3w_0}{w_2+2w_1+w_0}, \frac{6w_2}{w_2+2w_1+w_0}\right] = [1,1]$

$t=\frac{1}{2}$

Nech $w_0 = t \Rightarrow 3t = t + 2w_1 + w_2$

$6w_2 = t + 2w_1 + w_2$

$w_2 = 1/2\, t$ $\quad 2t = 2w_1 + 1/2\, t$

$w_1 = 3/4\, t$ $\quad 3/2\, t = 2w_1$

$w_0 = t$

$6w_2 - 3t = 0$

$6w_2 = 3t$

$w_2 = \frac{3}{6}t = \frac{1}{2}t$

Typ kužeľosečky určíme: $w_1^2 - w_2\cdot w_0 = \frac{9}{16}t^2 - \frac{1}{2}t^2 = t^2\left(\frac{9}{16} - \frac{8}{16}\right) = \left(\frac{t}{4}\right)^2 > 0$

je to teda hyperbola