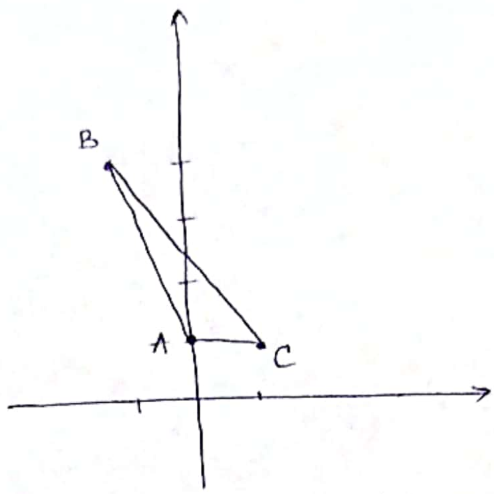
Фебруар 2021.

(1) $A(0,1)$ $B(-1,4)$ $C(1,1)$

$D = \begin{vmatrix} -1 & 3 \\ 1 & 0 \end{vmatrix} = -3 \rightarrow$ $\boxed{\triangle ABC \text{ је „-" оријентације}}$

$\boxed{P_\triangle = \frac{3}{2}}$

$\boxed{T(0,2)}$



$BT: \quad y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$

$y - 2 = \frac{4-2}{-1} x$

$-y + 2 = 2x$

$2x + y - 2 = 0$

$A: \quad 0 + 1 - 2 = -1 < 0$

$C: \quad 2 + 1 - 2 = 1 > 0$

$\Rightarrow$ тачке A и C су са супротне стране праве BT

(3.)

а) $\alpha_n(t) = \sum_{i=0}^{n} \binom{n}{i} t^i (1-t)^{n-i} P_i$

$\boxed{\alpha_2(t) = (1-t)^2 P_0 + 2t(1-t) P_1 + t^2 P_2}$

б)

$$\left((1-t)^2, 2t(1-t), t^2\right)\begin{pmatrix} P_0 \\ P_1 \\ P_2 \end{pmatrix} = (1, t, t^2) \overbrace{\begin{pmatrix} 1 & 0 & 0 \\ -2 & 2 & 0 \\ 1 & -2 & 1 \end{pmatrix}}^{M} \begin{pmatrix} P_0 \\ P_1 \\ P_2 \end{pmatrix}$$

$1 - 2t + t^2, 2t - 2t^2, t^2$

$= (1, t, t^2) \cdot M \cdot [P_0, P_1, P_2]^T$

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б) $t \in [3,8]$ $\qquad P_0(-3,-1)\quad P_1(2,7)\quad P_2(-8,2)$

$$t = \frac{u-a}{b-a} = \frac{u-3}{5}$$

$$\alpha_2(u) = \sum_{k=0}^{n} \binom{n}{k} \left(\frac{u-3}{5}\right)^k \left(1-\frac{u-3}{5}\right)^{n-k} P_k$$

$$= \left(1-\frac{u-3}{5}\right)^2 P_0 + 2\left(\frac{u-3}{5}\right)\left(1-\frac{u-3}{5}\right) P_1 + \left(\frac{u-3}{5}\right)^2 P_2$$

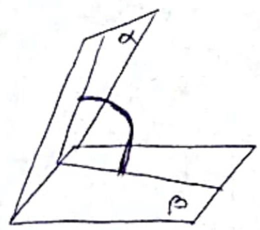
$$= \left(\frac{8-u}{5}\right)^2 (-3,-1) + \underbrace{\left(\frac{2u-6}{5}\cdot\frac{8-u}{5}\right)}(2,7) + \frac{u^2-6u+9}{25}(-8,2)$$

$$\frac{64-16u+u^2}{25} \qquad \frac{16u-2u^2-48+6u}{25} = \frac{-2u^2+22u-48}{25}$$

$$= \frac{1}{25}\left(-192+48u-3u^2-4u^2+44u-96-8u^2+48u-72,\ -64+16u-u^2-14u^2+154u-336+2u^2-12u+18\right)$$

$$\boxed{= \frac{1}{25}\left(-15u^2+140u-360,\ -13u^2+158u-382\right)}$$

4. a) $\boxed{\measuredangle(\alpha,\beta) = \arccos\dfrac{|\vec{n_\alpha}\circ\vec{n_\beta}|}{\|\vec{n_\alpha}\|\,\|\vec{n_\beta}\|}}$



б) $P(-1,0,1)\quad Q(1,0,-1)$

$p:\ x+y+z=0\ \ \gamma$

$\quad\ x-y+z=0\ \ \delta$

$\alpha:\ x+2y-2z+1=0 \qquad \varphi = \frac{\pi}{4}$

$\beta = ?$ $\qquad \hookrightarrow \vec{n_\alpha} = (1,2,-2)$

1) $\beta = \gamma = x+y+z \rightarrow \vec{n_\beta} = (1,1,1)$

$$\frac{\sqrt{2}}{2} = \frac{|1+2-2|}{\sqrt{1+4+4}\cdot\sqrt{3}} = \frac{1}{3\sqrt{3}} \ ↯$$

$\boxed{\Rightarrow \gamma \text{ није тражена раван}}$

2) $\beta = \gamma + \lambda\delta = x+y+z+\lambda(x-y+z) = 0$

$$\vec{n_\beta} = ((1+\lambda),(1-\lambda),(1+\lambda))$$

$$\frac{\sqrt{2}}{2} = \frac{|1+\lambda+\cancel{2}-2\lambda-\cancel{2}-2\lambda|}{3\cdot\sqrt{1+\cancel{2\lambda}+\lambda^2+1-\cancel{2\lambda}+\lambda^2+1+2\lambda+\lambda^2}}$$

$$\frac{\sqrt{2}}{2} = \frac{|1-3\lambda|}{3\sqrt{3\lambda^2+2\lambda+3}} \quad /^2$$

$$\frac{2}{4} = \frac{1-6\lambda+9\lambda^2}{9(3\lambda^2+2\lambda+3)}$$

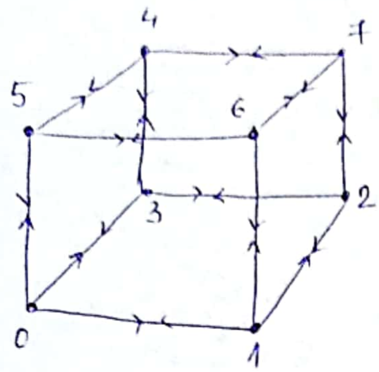
$$\overset{9}{\cancel{18}}(3\lambda^2+2\lambda+3) = \overset{2}{\cancel{4}}(1-6\lambda+9\lambda^2) \ /:2$$

$$27\lambda^2+18\lambda+27 = 2-12\lambda+18\lambda^2$$

$$9\lambda^2+30\lambda+25=0$$

$$\lambda_{12} = \frac{-30\pm\sqrt{900-900}}{18} = \frac{-30}{18}$$

$$\boxed{\lambda = -\frac{5}{3}}$$



$I = \{0, \dots 7\}$

$P = \{p_0, \dots p_5\}$

$p_0 = \langle 0,1,2,3 \rangle$

$p_1 = \langle 1,0,5,6 \rangle$

$p_2 = \langle 2,1,6,7 \rangle$

$p_3 = \langle 3,2,7,4 \rangle$

$p_4 = \langle 0,3,4,5 \rangle$

$p_5 = \langle 6,5,4,7 \rangle$

$I = \{\overleftrightarrow{01}, \overleftrightarrow{12}, \overleftrightarrow{23}, \overleftrightarrow{30}, \overleftrightarrow{05}, \overleftrightarrow{56}, \overleftrightarrow{61}, \overleftrightarrow{67}, \overleftrightarrow{72}, \overleftrightarrow{74}, \overleftrightarrow{43}, \overleftrightarrow{45}\}$

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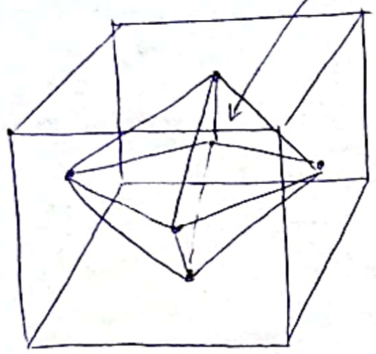

② $P_0(40,40)$ $\quad P_1(320,200)$

$Q_0(100,120)$ $\quad Q_1(500,440)$

$\lambda = P_1Q_1 : P_0Q_0$

$|P_0Q_0| = \sqrt{60^2+80^2} = 100$

$|P_1Q_1| = \sqrt{180^2+240^2} = 300$

$\Rightarrow \boxed{\lambda = 3}$

$A(20,20) \quad C(120,160)$

$\boxed{S(AC) = 70,80}$

$S' = 400,300$

$$H: \begin{pmatrix} 400 \\ 300 \end{pmatrix} = \begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix} \begin{pmatrix} 70 \\ 80 \end{pmatrix} + \begin{pmatrix} a \\ b \end{pmatrix}$$