1 a) $a[2:-1:4]$, $b[2:-1:-4]$

$$\{P\} = a \cap b \quad \vec{a}\times\vec{b} = \begin{vmatrix} e_1 & e_2 & e_3 \\ 2 & -1 & 4 \\ 2 & -1 & -4 \end{vmatrix} = (8; 16, 0)$$

$$\Rightarrow \boxed{P(8:16:0) = (1:2:0)}$$

b) $c = CP$

$$\vec{c}\times\vec{P} = \begin{vmatrix} e_1 & e_2 & e_3 \\ 3 & 6 & 1 \\ 1 & 2 & 0 \end{vmatrix} = (-2, 1, 0)$$

$$\Rightarrow \quad c[-2:1:0], \text{ tj } \boxed{c: -2x_1 + x_2 = 0}$$

c) $\vec{c} = \alpha\vec{a} + \beta\vec{b}$

$$(-2,1,0) = \alpha(2,-1,4) + \beta(2,-1,-4) = (2\alpha+2\beta, -\alpha-\beta, 4\alpha-4\beta)$$

tj $-2 = 2\alpha + 2\beta$

$$\begin{cases} 1 = -\alpha - \beta & \Longrightarrow 1 = -2\alpha \Rightarrow \boxed{\alpha = -\frac{1}{2} = \beta} \\ 0 = 4\alpha - 4\beta \Rightarrow \alpha = \beta \end{cases}$$

Vidimo da važi i prva jednačina $-2 = 2\alpha + 2\beta$ ✓

$d = ?$ $\quad \vec{d} = \mu\vec{a} + \delta\vec{b}$

$$H(a,b,c,d) \Rightarrow -1 = \frac{\beta}{\alpha} : \frac{\delta}{\mu} = 1 : \frac{\delta}{\mu} = \frac{\mu}{\delta} \Rightarrow \mu = -\delta$$

$$\Rightarrow \vec{d} = -\delta\vec{a} + \delta\vec{b} = \delta(\vec{b} - \vec{a}) = \delta((2,-1,-4) - (2,-1,4)) =$$

$$= \delta(0,0,-8), \quad \delta \neq 0$$

$d[0:0:-8\delta] = [0:0:1]$ (za $\delta = -\frac{1}{8}$)

$$\boxed{d: x_3 = 0}$$

d) $a: \; 2x_1 - x_2 + 4x_3 = 0 \quad /: x_3$

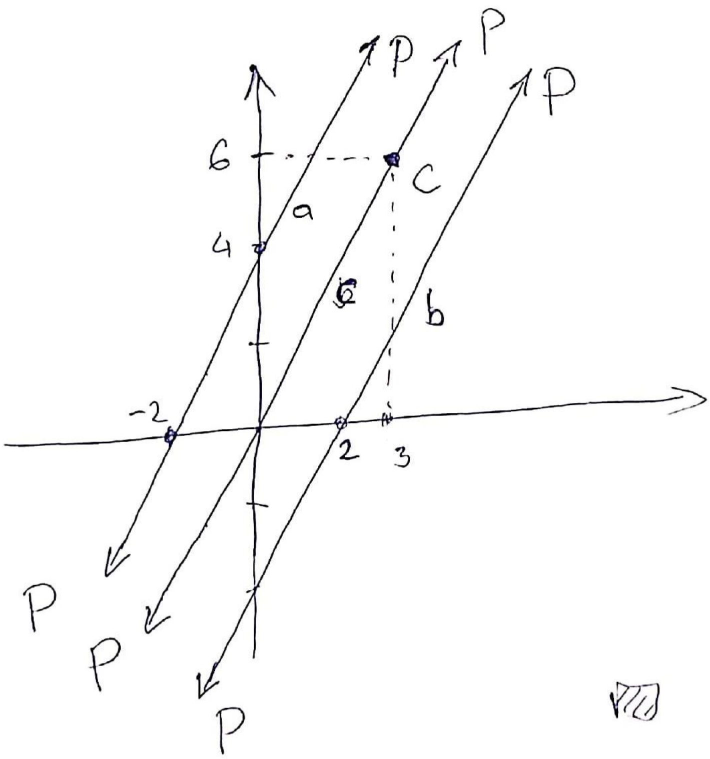
$$2\frac{x_1}{x_3} - \frac{x_2}{x_3} + 4 = 0$$

$a: \; 2x - y + 4 = 0$ tj $\boxed{a: \; y = 2x + 4}$

Slično dobijamo $\boxed{b: \; y = 2x - 4}$, $\boxed{c: \; y = 2x}$ paralelne prave.

$$\boxed{C(3:6:1) = (3,6)}$$

Tačka $P(1:2:0)$ je beskonačno daleka, pa nema afine koord.
Slično, prava $d: x_3 = 0$ je beskonačno daleka prava, pa nema afinu jednačinu, niti je možemo nacrtati.



2

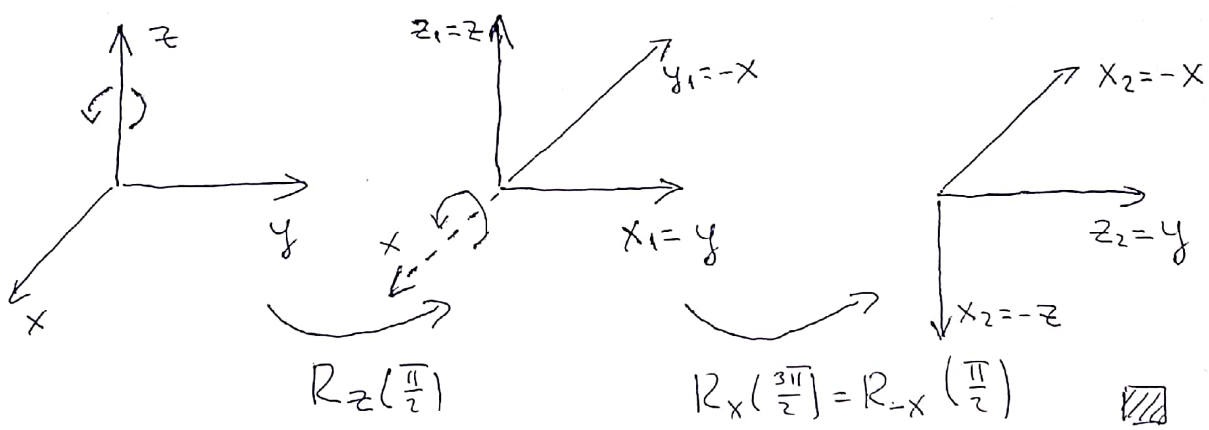
a)

$$R_{z_1}\left(\frac{\pi}{2}\right)=\begin{pmatrix}\cos\frac{\pi}{2} & -\sin\frac{\pi}{2} & 0\\ \sin\frac{\pi}{2} & \cos\frac{\pi}{2} & 0\\ 0 & 0 & 1\end{pmatrix}=\begin{pmatrix}0 & -1 & 0\\ 1 & 0 & 0\\ 0 & 0 & 1\end{pmatrix}$$

$$R_x\left(\frac{3\pi}{2}\right)=\begin{pmatrix}1 & 0 & 0\\ 0 & \cos\frac{3\pi}{2} & -\sin\frac{3\pi}{2}\\ 0 & \sin\frac{3\pi}{2} & \cos\frac{3\pi}{2}\end{pmatrix}=\begin{pmatrix}1 & 0 & 0\\ 0 & 0 & 1\\ 0 & -1 & 0\end{pmatrix}$$

$$A=R_x\cdot R_z=\begin{pmatrix}1 & 0 & 0\\ 0 & 0 & 1\\ 0 & -1 & 0\end{pmatrix}\begin{pmatrix}0 & -1 & 0\\ 1 & 0 & 0\\ 0 & 0 & 1\end{pmatrix}=\boxed{\begin{pmatrix}0 & -1 & 0\\ 0 & 0 & 1\\ -1 & 0 & 0\end{pmatrix}}$$

b)



3) $R_z\left(\frac{\pi}{2}\right)$: $p=(0,0,1)$, $\varphi=\frac{\pi}{2} \Rightarrow \frac{\varphi}{2}=\frac{\pi}{4}$

$$\Rightarrow \cos\frac{\varphi}{2}=\frac{\sqrt{2}}{2},\quad \sin\frac{\varphi}{2}=\frac{\sqrt{2}}{2}$$

$$R_z\left(\frac{\pi}{2}\right)=C_{q_1}:\quad q_1=\left[\frac{\sqrt{2}}{2}(0,0,1),\frac{\sqrt{2}}{2}\right]=\frac{\sqrt{2}}{2}k+\frac{\sqrt{2}}{2}=\frac{\sqrt{2}}{2}(k+1)$$

Slično $R_x\left(\frac{3\pi}{2}\right)=C_{q_2}$, $q_2=\frac{\sqrt{2}}{2}(i-1)$

$$R_x\left(\frac{3\pi}{2}\right)\circ R_z\left(\frac{\pi}{2}\right)=C_{q_2}\circ C_{q_1}=C_{q_2\circ q_1}$$

$$q=q_2\cdot q_1=\frac{\sqrt{2}}{2}(i-1)\frac{\sqrt{2}}{2}(k+1)=\frac{1}{2}(i-1)(k+1)=\frac{1}{2}(-j+i-k-1)$$

Matrici A odgovara $\boxed{q=\frac{1}{2}(i-j-k-1)}$

$$g = \frac{1}{2}(i-j-k-1) = \frac{1}{2}(i-j-k) - \frac{1}{2} =$$

$$= \frac{\sqrt{3}}{2}\,\frac{1}{\sqrt{3}}(i-j-k) - \frac{1}{2} = \left[\sin\frac{\varphi}{2}\cdot p,\ \cos\frac{\varphi}{2}\right]$$

Dalle $\boxed{p = \frac{1}{\sqrt{3}}(1,-1,-1) = \frac{\sqrt{3}}{3}(1,-1,-1)}$

$$\sin\frac{\varphi}{2} = \frac{\sqrt{3}}{2},\quad \cos\frac{\varphi}{2} = -\frac{1}{2} \Rightarrow \frac{\varphi}{2} = 120° \Rightarrow \boxed{\varphi = 240°}$$

$$A = C_g = R_p(\varphi)$$