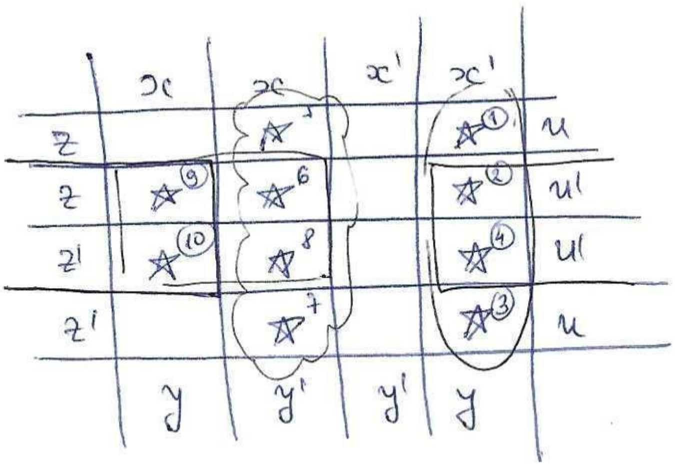
1.
$$f(x,y,z,u) = (x+y')' + xy' + xyu' =$$
$$= x' \cdot y + xy' + xyu' =$$
$$= x'y(z+z')(u+u') + xy'(z+z')(u+u') + xy(z+z')u'$$
$$= \overset{1}{x'yzu} + \overset{2}{x'yzu'} + \overset{3}{x'yz'u} + \overset{4}{x'yz'u'}$$
$$+ \overset{5}{xy'zu} + \overset{6}{xy'zu'} + \overset{7}{xy'z'u} + \overset{8}{xy'z'u'}$$
$$+ \overset{9}{xyzu'} + \overset{10}{xyz'u'}$$



PROSTE IMPL: $x'y$, xy', xu', yu'

MDNF:

$$\Phi_1 = x'y + xy' + xu'$$
$$\Phi_2 = x'y + xy' + yu'$$

2.
$$|z| - z = 9 + 5i \qquad z = x + yi, \quad x, y \in \mathbb{R}$$
$$|x+yi| - (x+yi) = 9 + 5i$$
$$\sqrt{x^2+y^2} - x - yi = 9 + 5i$$
$$\sqrt{x^2+y^2} - x = 9 \quad \wedge \quad -y = 5$$
$$\Downarrow$$
$$\boxed{y = -5}$$
$$\sqrt{x^2+25} = x + 9 \quad |^2$$
$$x^2 + 25 = x^2 + 18x + 81$$
$$18x = -56$$
$$x = -\frac{56}{18} = -\frac{28}{9}$$
$$\boxed{z = -\frac{28}{9} - 5i}$$

3.

$$p(x) = x^7 + 2x^5 + 2x^4 - 11x^3 + 10x^2 - 12x + 8$$

$2i$ – KOREN $\Rightarrow$ $-2i$ KOREN

$$(x-2i)(x+2i) = x^2+4 \mid p(x)$$

$$(x^7 + 2x^5 + 2x^4 - 11x^3 + 10x^2 - 12x + 8) : (x^2+4) = \underbrace{x^5 - 2x^3 + 2x^2 - 3x + 2}_{q(x)}$$

$$\begin{array}{l}
-\ (x^7 + 4x^5) \\
\hline
-2x^5 + 2x^4 - 11x^3 + 10x^2 - 12x + 8 \\
-\ (-2x^5 - 8x^3) \\
\hline
2x^4 - 3x^3 + 10x^2 - 12x + 8 \\
-\ (2x^4 + 8x^2) \\
\hline
-3x^3 + 2x^2 - 12x + 8 \\
-\ (-3x^3 - 12x) \\
\hline
2x^2 + 8 \\
-\ (2x^2 + 8) \\
\hline
0
\end{array}$$

$q(x)$: KANDIDATI ZA RACIONALNE NULE : $\{\pm 1, \pm 2\}$

	1	0	-2	2	-3	2
1	1	1	-1	1	-2	$\boxed{0}$
1	1	2	1	2	$\boxed{0}$	
-2	1	0	1	$\boxed{0}$		

$$q(x) = (x-1)^2 \cdot (x+2)(x^2+1)$$

$p(x) = (x-2i)(x+2i)(x-i)(x+i)(x-1)^2(x+2)$ FAKTORIZACIJA NAD $\mathbb{C}$

$p(x) = (x^2+4)(x^2+1)(x-1)^2(x+2)$ FAKTORIZACIJA NAD $\mathbb{R}$

FAKTORIZACIJA NAD $\mathbb{Z}_3$:

$$p(x) = (x^2+1)(x^2+1)(x+2)^2(x+2) = (x^2+1)^2(x+2)^3$$

1.

$$\begin{aligned}
ax + y + z + u &= 0\\
x + ay + az + au &= 0\\
x + y + az + u &= 2\\
x + y + z + au &= 6
\end{aligned}$$

$$\begin{array}{ll}
y + ax + z + u = 0 & (-a) \quad (-1) \quad (-1)\\
ay + x + az + au = 0 & +\\
y + x + az + u = 2 & +\\
y + x + z + au = 6 & +
\end{array}$$

$$\begin{aligned}
y + ax + z + u &= 0\\
(1-a^2)x &= 0\\
(1-a)x + (a-1)z &= 2\\
(1-a)x + (a-1)u &= 6
\end{aligned}$$

$a \in \mathbb{R} \setminus \{-1, 1\}$:

$$y + ax + z + u = 0$$

$$x = 0$$

$$z = \frac{2}{a-1}$$

$$u = \frac{6}{a-1}$$

$$y = -z - u = -\frac{2}{a-1} - \frac{6}{a-1}$$

$$y = -\frac{8}{a-1}$$

SISTEM JE ODREĐEN!

$$R_S = \left\{\left(0, -\frac{8}{a-1}, \frac{2}{a-1}, \frac{6}{a-1}\right)\right\}$$

$a = -1$:

$$\begin{aligned}
y - x + z + u &= 0\\
0 &= 0\\
2x - 2z &= 2\\
2x - 2u &= 6
\end{aligned}$$

$$u = \frac{2x-6}{2} = x - 3$$

$$z = \frac{2x-2}{2} = x - 1$$

$$y = x - z - u$$

$$y = x - x + 1 - x + 3 = 4 - x$$

SISTEM JE JEDNOSTRUKO NEODREĐEN!

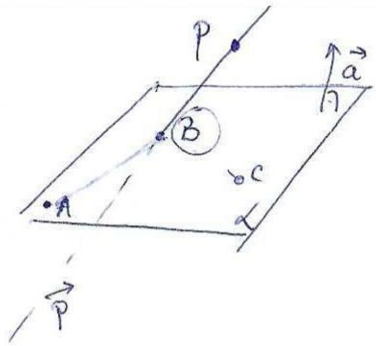
$$R_S = \{(x, 4-x, x-1, x-3) \mid x \in \mathbb{R}\}$$

$a = 1$:

$$\begin{aligned}
y + x + z + u &= 0\\
0 &= 0\\
0 &= 2 \ \lightning
\end{aligned}$$

SISTEM JE KONTRADIKTORAN

[illegible]



$\{B\} \in p \cap \alpha \xrightarrow{} B$ JE PRODOR PRAVE KROZ RAVAN

$$\vec{r}_B = \vec{r}_p + \frac{(\vec{r}_A - \vec{r}_p)\cdot \vec{a}}{\vec{a}\cdot\vec{p}}\,\vec{p}$$

$$\vec{r}_C = \vec{r}_B \pm |\vec{AB}| \cdot \frac{\vec{l}}{|\vec{l}|} = \vec{r}_B \pm |\vec{AB}| \cdot \frac{\vec{AB}\times\vec{a}}{|\vec{AB}\times\vec{a}|}$$

$$\left.\begin{array}{l} \vec{l} \perp \vec{AB} \\ \vec{l} \perp \vec{a} \end{array}\right\} \boxed{\vec{l} = \vec{AB}\times\vec{a}}$$

$$\vec{BC} = \vec{AD} \Rightarrow \vec{r}_D = \vec{r}_C - \vec{r}_B + \vec{r}_A$$
$$\vec{r}_C - \vec{r}_B = \vec{r}_D - \vec{r}_A$$

ILI ISTO KAO C; SAMO IZ TAČKE A:

$$\vec{r}_D = \vec{r}_A \pm |\vec{AB}| \cdot \frac{\vec{AB}\times\vec{a}}{|\vec{AB}\times\vec{a}|}$$

(3.) $\vec{v} = (x, y, z)$ $\quad \vec{a} = (1,0,1)$ $\quad \vec{b} = (2,-4,4)$ $\quad \vec{c} = (-1,2,-2)$

$\vec{c} = -\frac{1}{2}\vec{b}$ (A)

VEKTORI $\vec{a}, \vec{b}$ i $\vec{c}$ SU LIN. ZAVISNI

$$\vec{a}\times\vec{v} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 0 & 1 \\ x & y & z \end{vmatrix} = (-y,\ -z+x,\ y)$$

(B)

$$\vec{a}\times\vec{v} - \vec{b} = (-y, -z+x, y) - (2,-4,4) = (-y-2,\ x-z+4,\ y-4)$$

$$f(\vec{v}) = (\vec{a}\times\vec{v} - \vec{b})\times\vec{c} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -y-2 & x-z+4 & y-4 \\ -1 & 2 & -2 \end{vmatrix} =$$

$$= \cancel{(-z+2y+4+x-z+4,\ -2y-4-y+4,\ -2y-4}$$

$$= (-2x+2z-8-2y+8,\ -2y-4-y+4,\ -2y-4+x-z+4)$$

$$= (-2x-2y+2z,\ -3y,\ x-2y-z)$$

$$M_f = \begin{bmatrix} -2 & -2 & 2 \\ 0 & -3 & 0 \\ 1 & -2 & -1 \end{bmatrix}$$

zavisne kolone

(C) rang $M_f = 2$