Problema 1. i) *Aflati transformarea liniara* $f:\mathbb{R}^3 \to \mathbb{R}^3$ *care verifica conditiile:*

$$f(1,2,-1)=(1,1,1),\quad f(2,0,2)=(-1,-1,3),\quad f(0,0,1)=(-2,2,2) \qquad (1p)$$

ii) *Aflati imaginea lui* $M(2,0,3)$ *prin aceasta transformare.* $(1p)$

Problema 2.

i) *Aratati ca urmatorii vectori formeaza o baza in* $\mathbb{R}^3$*:*

$$B=\{u_1=(1,-2,3), u_2=(1,1,1), u_3=(-1,-1,4)\} \qquad (1p)$$

ii) *Aflati coordonatele vectorului* $v=(-1,1,1)$ *in aceasta baza* $(0,5p)$

iii) *Aflati matricea de trecere de la baza* B *la baza canonica* B_c *din* $\mathbb{R}^3$. $(0,5p)$

Problema 3. *Rezolvati sistemul*

$$\begin{cases} a+2b-c=1 \\ -2a-4b+2c=-2 \\ -3a-6b+3c=-3 \end{cases}$$

1 punct

Problema 4. *Aflati vectorii si valorile proprii corespunzatoare matricei:*

$$M=\begin{pmatrix} 1 & 2 \\ 3 & -4 \end{pmatrix}$$

2 puncte

Problema 5. *Consideram vectorii* $\bar{a}=(-2,1,3), \bar{b}=(1,1,-1)$ *si* $\bar{c}=(1,-2,-2)$.

i) *Aratati ca vectorii* $\bar{a},\bar{b},\bar{c}$ *pot forma un triunghi* $(0,5p)$

ii) *Demonstrati ca are loc identitatea:*

$$\bar{b}\times(2\bar{c})=2(\bar{b}\times\bar{c}) \qquad (0,5p)$$

iii) *Aflati proiectia lui* $\bar{a}$ *pe* $\bar{c}$ $(0,5p)$

iv) *Aflati unghiul dintre vectorii* $\bar{b}$ *si* $\bar{c}$ $(0,5p)$