Problema 1. *Determinati inversa matricei:*

$$A = \begin{pmatrix} 1 & -1 & 0 \\ -1 & 2 & 0 \\ 0 & 0 & 3 \end{pmatrix}$$

1 punct

Problema 2. *Determinati vectorii si valorile proprii corespunzatoare matricei:*

$$Q = \begin{pmatrix} 2 & 2 \\ 5 & -1 \end{pmatrix}$$

2 puncte

Problema 3.

i) *Aratati ca urmatorii vectori sunt generatori ai spatiului* $\mathbb{R}^3$*:*

$B = \{(1,1,-2),(2,-1,1),(3,-1,1)\}$ $(1p)$

ii) *Vectorul* $\mathbf{w}$ *are cordonatele* $(2,-1,-1)$ *in baza* B *afisata mai sus, aflati coordonatele sale in baza canonica* $(0,5p)$

iii) *Construiti o alta baza din* $\mathbb{R}^3$*, diferita de* B*, care sa contina vectorii* $v_1 = (1,1,-2)$ *si* $v_2 = (2,-1,1)$*. Justificati alegerea.* $(0,5p)$

Problema 4. *Consideram punctele* $A(1,2,1), B(-1,2,1)$*,* $C(2,2,2)$ *si* $D(-1,1,1)$*.*

i) *Aflati aria tringhiului* ABC $(0,5p)$

ii) *Aflati proiectia vectorului* $\overline{AC}$ *pe* $\overline{BD}$ $(0,5p)$

iii) *Aflati unghiul format de vectorii* $\overline{AB}$ *si* $\overline{BC}$ $(0,5p)$

iv) *Aflati lungimea inaltimii duse din* B *in triunghiul* BCD $(0,5p)$

Problema 5. *Fie transformarea* $T : \mathbb{R}^3 \to \mathbb{R}^3$ *definita prin:*

$$T(x,y,z) = (x - 3y + 2z, x + y, -4y + 2z)$$

i) *Aratati ca* T *este o aplicatie (transformare) liniara si aflati matricea atasata aplicatiei in baza canonica din* $\mathbb{R}^3$ $(1p)$

ii) *Aratati ca punctul* $A(0,0,0)$ *este imaginea punctului* $B(1,-1,-2)$ *prin aceasta transformare* $(0,5p)$

iii) *Aflati toate punctele care sunt transformate in* A *prin transformarea* T $(0,5p)$