



**The Second Formative Assessment Exam**

**Exercise 1 : (7.25pts)**

Consider the matrices :

$$A = \begin{pmatrix} 1 & -5 & 2 \\ 3 & -6 & -3 \\ -4 & 2 & 7 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 3 & 2 \\ 4 & -2 & 3 \end{pmatrix}$$

1. Calculate :  $B^T, BA$ .
2. Compute  $\det(A)$  by applying row reduction method, and then deduce  $\text{rank}(A)$ .
3. Is  $A$  invertible ? If yes, then determine  $A^{-1}$ .
4. Let  $v = \begin{pmatrix} b \\ 2a \\ 1 \end{pmatrix}$ . Determine  $b$  and  $a$  such that  $Bv = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$

**Exercise 2: (3pts)**

Let  $T$  be a linear transformation defined by:

$$T: \mathbb{R}^3 \rightarrow \mathbb{R}^3 \\ (x, y, z) \rightarrow (x + 2ky, 2x - kz, 4x + 3z) \quad \text{Where } k \text{ is a real number}$$

1. Determine the matrix representation of  $T$ .
2. Determine the values of  $k$  such that  $T$  is not invertible (not bijective).

Good luck