(1) (18 Points) Let

\[ A = \begin{pmatrix} 1 & 1 & 2 & 3 \\ -1 & -1 & 1 & 1 \\ 1 & 1 & 8 & 11 \end{pmatrix} . \]

Find the general parametric vector solution of \( Ax = 0 \).

(2) (17 Points) Assume the demand vector \( d \) and consumption matrix \( C \) are given by

\[ d = \begin{pmatrix} 16 \\ 38 \\ 48 \end{pmatrix} \quad \text{and} \quad C = \begin{pmatrix} .2 & 0 & 0 \\ .1 & .5 & .1 \\ .1 & .2 & .3 \end{pmatrix} . \]

Find the production vector \( x \) such that \( x = Cx + d \).

(3) (20 Points) Let \( T \) be the linear transformation from \( \mathbb{R}^2 \) to \( \mathbb{R}^3 \) such that

\[ T \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \\ 5 \end{pmatrix} \quad \text{and} \quad T \begin{pmatrix} 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ 8 \\ 12 \end{pmatrix} . \]

(a) What is \( T \begin{pmatrix} 0 \\ 1 \end{pmatrix} \)?
(b) What is the matrix of \( T \)?
(c) Is \( T \) one-to-one?
(d) Is \( T \) onto?

(4) (24 Points) (Material not covered.)

(5) (9 Points) (Material not covered.)

(6) (12 Points) Indicate which of the following statements are true (T) and which are false (F).

(a) (Material not covered.)
(b) The matrix of an invertible transformation must be square (number of rows equals the number of columns).
(c) If the equation \( Ax = 0 \) has a nontrivial solution, then \( A \) has fewer pivots than the number of rows.
(d) If the rank of \( A \) equals the number of columns, then the linear transformation of \( A \) must be onto.