

MA552. Quiz 8

Let us define a linear mapping f of R^4 into itself by giving the coordinates X, Y, Z, T of the vector $f(u)$ as a function of the coordinates x, y, z, t of the vector u :

$$\begin{aligned} X &= x + y + z - t \\ Y &= -x + y - z - t \\ Z &= x - y - z - t \\ T &= -x - y + z + 3t \end{aligned}$$

Determine the rank of f and define the space $f(R^4)$. Show that $f(R^4)$ has no points in common with the domain D defined by

$$X > 0, Y > 0, Z > 0, T > 0,$$

i.e. that there do not exist values for $x, y, z,$ and t such that these four inequalities are verified.