MATH 104: WORKSHEET 4

1. Concepts

(1) Row-reduction
(2) Inverse
(3) Linear transformation

2. Discussions

Question 1. Parametrize the intersection of the planes

$$3x + y - z = 4$$

and

$$x - 2y + z = 1.$$

Set this up as a row-reduction problem to obtain the answer.

Question 2. Compute the inverse of the following 3×3 matrix by row reduction.

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

Your result should be

$$\frac{1}{8}\begin{pmatrix} 2 & 2 & 2 \\ -6 & 2 & -6 \\ 3 & -1 & -1 \end{pmatrix}.$$

Question 3. (1) Why is it that

$$(AB)^{-1} = B^{-1}A^{-1}\,?$$

(2) Why is it that

$$(AB)^{T} = B^{T}A^{T}\,?$$

Question 4. Explain why this is a rotation matrix

$$\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}.$$

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