# Inconsistent

What is the difference between a system of equations being inconsistent and a system having infinitely many solutions?

# One-to-one and onto

Do the following give linear transformations that are one-to-one? onto?

$$\begin{pmatrix} 1 & 0 & 7 \\ 0 & 1 & 2 \\ 0 & 0 & 9 \end{pmatrix} \quad \begin{pmatrix} 1 & 0 \\ 1 & 1 \\ 2 & 1 \end{pmatrix} \quad \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix} \quad \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$$

# Exam 1

## Problem 5

*(a)* Consider the matrix

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

and let $T_A$ be the associated linear transformation.

Is $T_A$ one-to-one?

Find one nonzero vector $b$ in the range of $T_A$.

# Exam 1

## Problem 5

*(b)* Find a matrix $A$ so that $T_A$ is the linear transformation $\mathbb{R}^2 \to \mathbb{R}^2$ obtained by first reflecting about the line $y = -x$ and then rotating clockwise by $\pi/2$. (Note: this problem is completely independent of the first problem on this page—the two $A$s have nothing to do with each other.)

# Least Squares

Consider the points $(0,0)$, $(0,1)$, $(1,-1)$, and $(-1,0)$ in the $xy$–plane.

Find the best fit line.

Find the best fit quadratic $y = f(x)$.

Find the best fit cubic $y = f(x)$.

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