

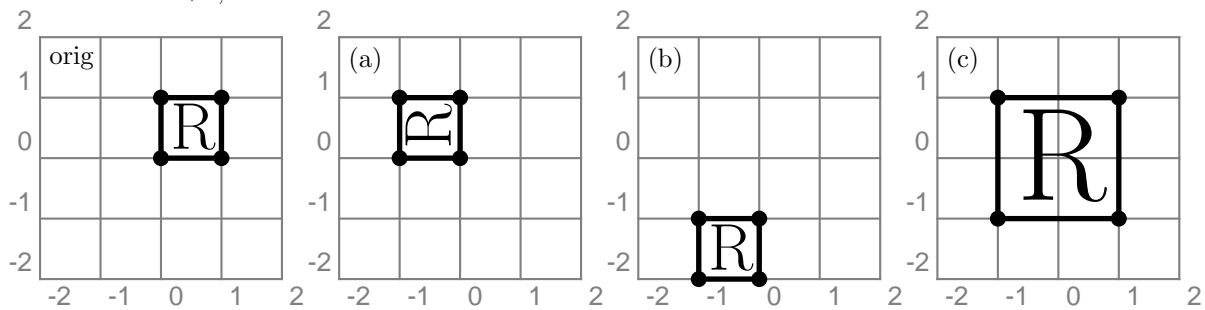
# CS 230, Quiz 4

## Solutions

You will have 8 minutes to complete this quiz. No books, notes, or other aids are permitted.

### Problem 1 (Problem 1 points)

A square with a letter (shown in the diagram labeled “orig” below) is transformed into each of the configurations (a)-(c). In each case, identify the type of transform and, if possible, find a  $3 \times 3$  homogeneous transform matrix corresponding to it. In each case, identify the transform as a R=rotation, T=translation, S=uniform scale, X=none of these. R, S, and T can be combined. The most restrictive option should be chosen. Thus, a transform that can be accomplished by a combination of rotation and uniform scale should be described as R+S, not as X.



(a) R.  $\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

(b) T.  $\begin{pmatrix} 1 & 0 & -1 \\ 0 & 1 & -2 \\ 0 & 0 & 1 \end{pmatrix}$

(c) S+T.  $\begin{pmatrix} 2 & 0 & -1 \\ 0 & 2 & -1 \\ 0 & 0 & 1 \end{pmatrix}$