Suggested problems
Translations and affine transformations

There’s not a whole not new in here other than simply recognizing that a transformation that involves a $+ b$ for some vector $b$ is affine, not linear.

P1: Write $T(<x, y>)$ as a matrix equation, and find the image of the unit square under the transformation:

$$T(<x, y>) = <3x + 2y - 4, -x + 6y + 1>$$

P2: Find the image of a unit square under the composite transformation $T = T_2 \circ T_1$, where $T_2$ is a rotation through an angle of $\frac{\pi}{4}$, and $T_1$ is a shift 3 to the right and down 4. Work out the matrix form of the transformation.

Does the order you transform in matter? Does shift, then rotate work out the same as rotate, then shift. Compose $T_1 \circ T_2$ and see what happens.