

Using Transformer

a.) $A = \begin{pmatrix} 3 & 1 \\ 1 & 2 \end{pmatrix}$

b.) $A = \begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$

c.) $A = \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}$

d.) $A = \begin{pmatrix} -0.8 & -0.6 \\ 0.6 & -0.8 \end{pmatrix}$

e.) $A = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$

f.) $A = \begin{pmatrix} 3 & 4 \\ 4 & -3 \end{pmatrix}$

g.) $A = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$

h.) $A = \begin{pmatrix} 4 & 0 \\ 0 & -2 \end{pmatrix}$

Use [Transformer](#) in order to answer the following questions

- For each of the matrices above, (1) describe what happens to the **UNIT circle** under the transformation, (2) describe what happens to the **UNIT square** under the transformation, (3) describe what happens to the **UNIT grid** under the transformation, (4) describe what happens to the **QUAD** under the transformation, and (5) over all what does the particular matrix of transformation do to a geometric figure in the domain, i.e. what does the image look like in the codomain?

	UNIT circle	UNIT square	UNIT grid	QUAD	Overall
a					
b					
c					

	UNIT circle	UNIT square	UNIT grid	QUAD	Overall
d					
e					
f					
g					
h					

5. Build examples of various reflections, i.e. across x-axis, y-axis, in the origin, and across a line $y = ax$, $a \in \mathbb{R}$. Describe a matrix for each and how it transformed the circle, the unit square, and a quadrilateral.

6. Build examples of various contractions and expansions. Describe a matrix for each and how it transformed the circle, the unit square, and a quadrilateral.

7. Build examples of shears, i.e. vertical and horizontal. Describe a matrix for each and how it transformed the circle, the unit square, and a quadrilateral. Can you ever have a diagonal shear? Explain why or why not.

8. Build examples of projections, i.e. onto the horizontal axis and onto the vertical axis. Describe a matrix for each and how it transformed the circle, the unit square, and a quadrilateral.