While the matrix equation \_\_\_\_\_\_\_\_\_\_\_\_\_ and the vector equation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are essentially the same except for notation, there is a case where the matrix equation represents an action on a vector that isn’t directly connected with a linear combination of vectors.





Does this picture look familiar from other math you’ve seen?

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *T* from  to is a rule that assigns each vector to a vector .

The set  is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of *T*.

The set is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of *T*.

For , the vector is called the \_\_\_\_\_\_\_\_\_\_\_\_\_ of .

The set of all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 

is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of *T*.

Review Ex. 5 on page 68 of a Rotation Transformation.











called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

For the image below, let’s look at the transformations of the vectors 





Since the above properties are true for all matrices, then every \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transformation is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ transformation. (Though the reverse is not true.)

Furthermore, (mini proof)



The second property here actually can be generalized to

 

This is referred to as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in engineering and physics.



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Let  and show that T is a linear transformation.



