

An Exploration into Linear Algebra

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Idk man, I just work here

1 Basic Matrix Code

To begin, we have will create code that represents matrices and performs elementary matrix operations, such as computing the inverse, multiplying, and adding.

We will utilise python to do so. Python has a data structure known as a "list" or an "array." These are essentially a collection of indexed data than can be manipulated. Lists may contain sublists; it is in this way that we can represent a "matrix" in python, for indeed, a matrix contains

1.1 Matrix Multiplication

```
def project_vector(vector, proj_mat, return_error=False):  
  
    '''  
    if using sub_space obj, will look like newvec =  
        project_vector(vec, sub_space.proj_mat)  
    '''  
  
    projected = mp.multiply_matrix(proj_mat, [vector])  
  
    if return_error == False:  
        return projected[0]  
    else:  
        return mp.mround(projected)[0],  
            euclidean_norm(mp.subtract_row(vector, projected[0]))
```

- 2 Representing Subspaces Pythonically**
- 3 Representing Linear Mappings Pythonically**
- 4 More Advanced Matrix Operations**
 - 4.1 Solving Homogeneous Matricies**
 - 4.2 Finding Eigenvalues and Eigenvectors Of A Matrix**
 - 4.3 Finding the Eiegendecomposition**
 - 4.4 Finding the Singular Value Decomposition**