

Q2

(1)

**BASIS -> 35**



**BASIS->520**

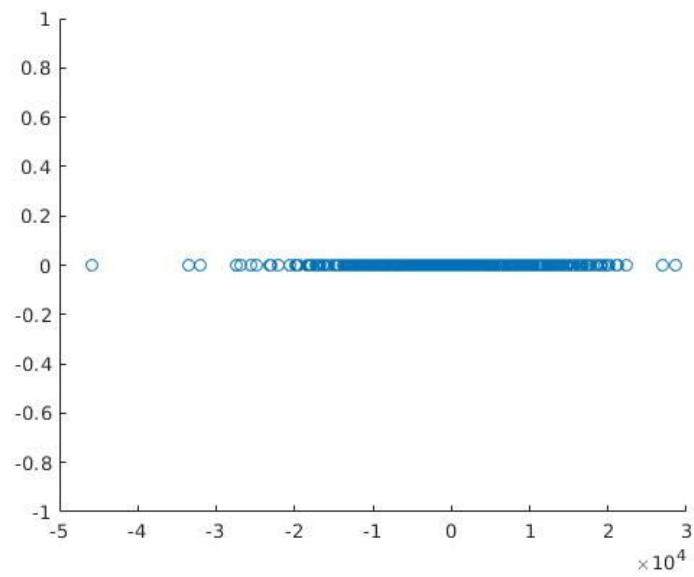


### **Reasoning**

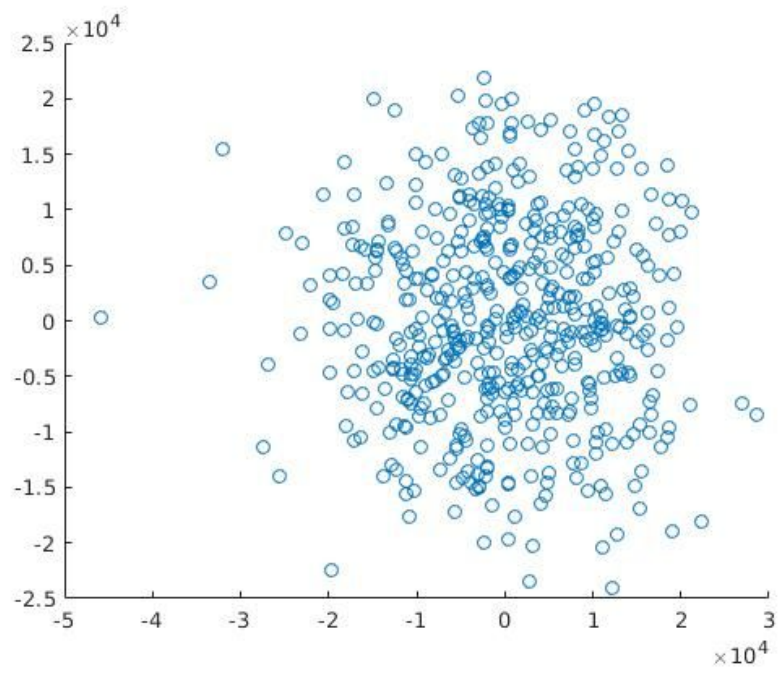
1. Calculate the Eigen Vectors of the covariance matrix. I used Graham's method for this. Graham's method ->
  - To find eigen vectors for  $A^*A$  we first find eigen vectors for  $A^*A'$  (say they are stored in  $V$ ).
  - Eigen vectors for  $A^*A$  are  $A^*V$ .
  - Take 35 eigen vectors with the largest eigen values, and store them in  $V$ .
2. Convert  $V$  to unit vectors.
3. Compression: Find projection by taking dot products ( $X^*V$ )
4. Reconstruction: By converting from the 35 dim space to points in the bigger space( $\text{compressed\_X}^*\text{transpose}(V)$ )

(2)

**DATA SPREAD IN 1D SPACE**



**DATA SPREAD IN 2D SPACE**



**DATA SPREAD IN 3D SPACE**

