1. Consider the data below. What is \( m \)? What is \( p \)? Draw a graph showing these points.

\[
X = \begin{bmatrix}
3 & 2 \\
2 & 2 \\
4 & -1
\end{bmatrix}
\]

2. Compute the mean of these points, and plot it on your graph.

3. Compute the total sum of squares for this dataset.

4. Let’s say we have \( k = 2 \) clusters. What are the means of these clusters? Use the means to compute the within-cluster sum of squares for \( k = 2 \).

5. What if we have \( k = 3 \) clusters? What is the within-cluster sum of squares?
6. **Elbow Plot:** Finally, compute the proportion of explained variance for $k = 1, 2, 3$, and draw a graph showing this pattern ($k$ on the $x$-axis and proportion of explained variance on the $y$-axis).