

Consider the data points in 2-D space of the following Figure 1.

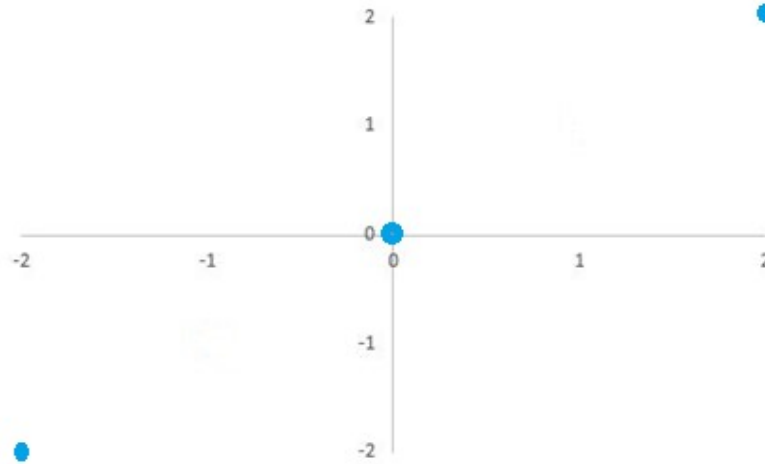


Figure 1: Dataset of the Points A(0,0), B(2, 2), C(-2, -2).

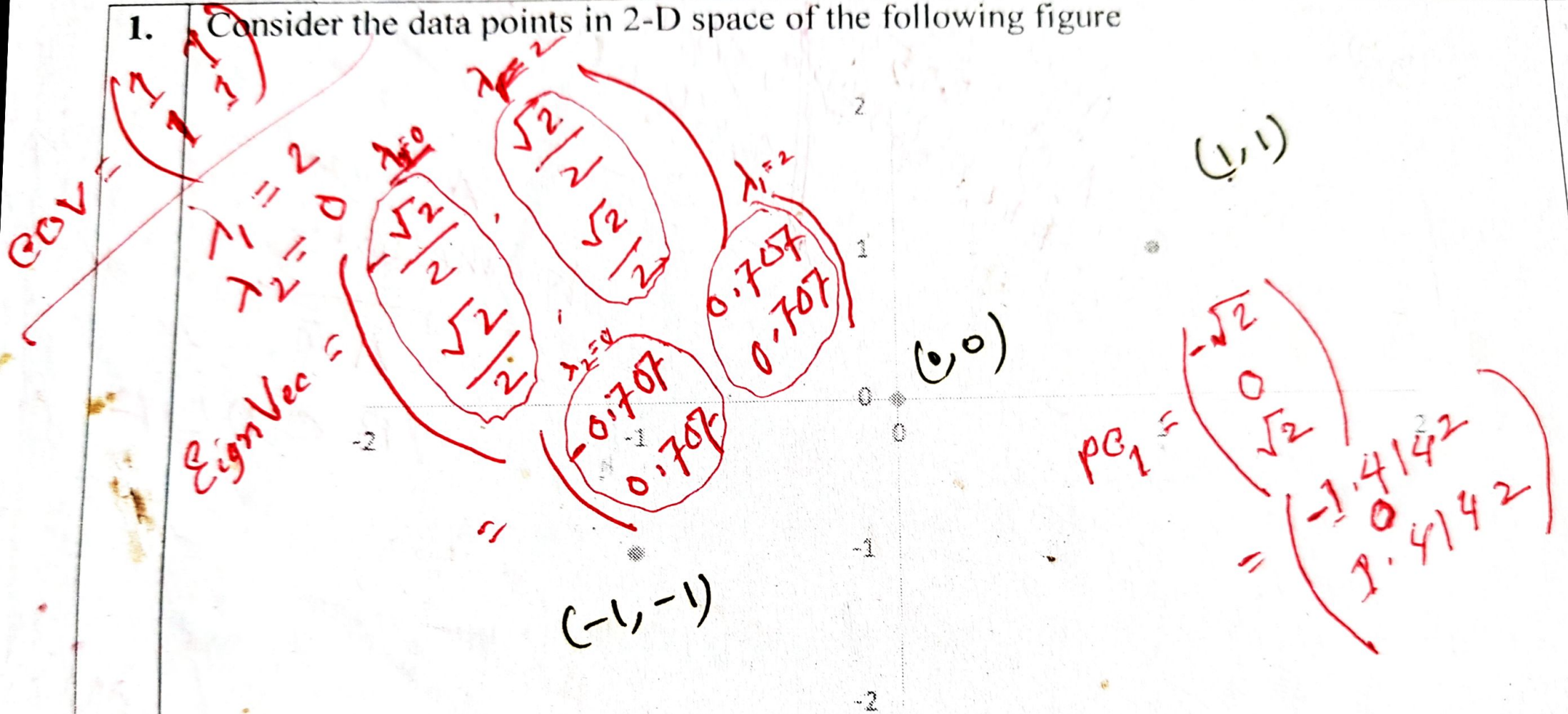
Apply principal components analysis (PCA) to determine the first principal component for the

dataset in Figure 1. Note that, you have to determine the eigenvectors $\begin{pmatrix} x_i \\ x_{i+1} \\ \vdots \\ x_n \end{pmatrix}$ and afterward, each

of the eigenvectors must be scaled to unit length eigenvector $\begin{pmatrix} x'_i \\ x'_{i+1} \\ \vdots \\ x'_n \end{pmatrix}$ using the equation $x'_i =$

$\frac{x_i}{\|x\|_2}$, Where, $\|x\|_2$ is the l_2 norm of vector $x = [x_i, x_{i+1}, \dots, x_n]$.

1. Consider the data points in 2-D space of the following figure



Apply principal components analysis (PCA) to determine the first principal component for this data? Note that, in determining the principal components, the eigenvectors should be scaled to unit length through the equation $x' = \frac{x}{\|x\|_2}$.