

```
In [ ]: """
```

Q1. What is a projection and how is it used in PCA?
 Ans -1 employees principal component analysis to the projected (smoothed) data matrix onto a given linear space spanned by covariates

Q2. How does the optimization problem in PCA work, and what is it trying to achieve?
 Ans-PCA can be used to reduce the dimensionality of the data by creating a set of derived variables that are linear combinations of the original variables. The values of the derived variables are given in the columns of the scores matrix Z.

Q3. What is the relationship between covariance matrices and PCA?
 Ans-PCA is simply described as “diagonalizing the covariance matrix”. What does diagonalizing a matrix mean in this context? It simply means that we need to find a non-trivial linear combination of our original variables such that the covariance matrix is diagonal.

Q4. How does the choice of number of principal components impact the performance?
 Ans-A widely applied approach is to decide on the number of principal components by examining a scree plot. By eyeballing the scree plot, and looking for a point at which the proportion of variance explained by each subsequent principal component drops off. This is often referred to as an elbow in the scree plot.

Q5. How can PCA be used in feature selection, and what are the benefits of using it?
 Ans 5-Principal Component Analysis (PCA) is a popular linear feature extractor used for unsupervised feature selection based on eigenvectors analysis to identify the most important features. PCA is used to visualize multidimensional data. It is used to reduce the number of dimensions in healthcare data. PCA can help resize an image. It can be used in finance to analyze stock data and forecast returns. PCA helps to find patterns in the high-dimensional datasets. Principal component.

Q6. What are some common applications of PCA in data science and machine learning?
 Ans 6-PCA is used to visualize multidimensional data. It is used to reduce the number of dimensions in healthcare data. PCA can help resize an image. It can be used in finance to analyze stock data and forecast returns. PCA helps to find patterns in the high-dimensional datasets.

Q7. What is the relationship between spread and variance in PCA?
 Ans 7 -pCA is defined as an orthogonal linear transformation that transforms the data to a new coordinate system such that the greatest variance by some scalar projection of the data comes to lie on the first coordinate (called the first principal component), the second greatest variance on the second coordinate, and so on.

Q9. How does PCA handle data with high variance in some dimensions but low variance in others?
 Ans PCA generally tries to find the lower-dimensional surface to project the high-dimensional data. PCA works by considering the variance of each attribute because the high attribute shows the good split between the classes, and hence