QUIZ ON PCA

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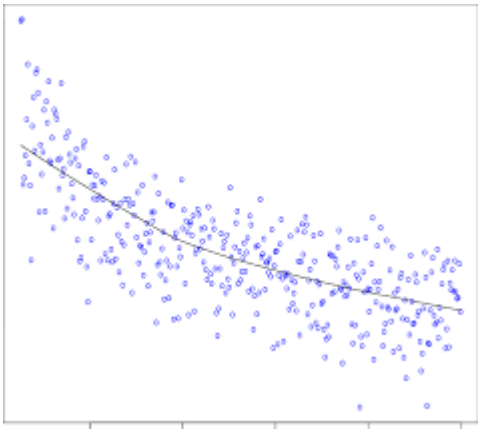
1. Which of the following statement(s) is/are CORRECT about PCA:
    A. PCA is an example of supervised learning
    B. PCA is an attribute/dimension reduction technique.
    C. PCA is an example of unsupervised learning
    D. PCA reduces the dimension by finding orthogonal linear combinations.
    E. PCA is a non linear method.

Correct Answer : B,C,D

2.



Mark the CORRECT statement(s) in accordance with the following scatter plot:

A. Var(X) < 0 and Var(Y) > 0
B. Var(X) > 0 and Var(Y) > 0
C. Covar(X,Y) > 0
D. Covar(Y,X) < 0
E. Covar(X,Y) = 0

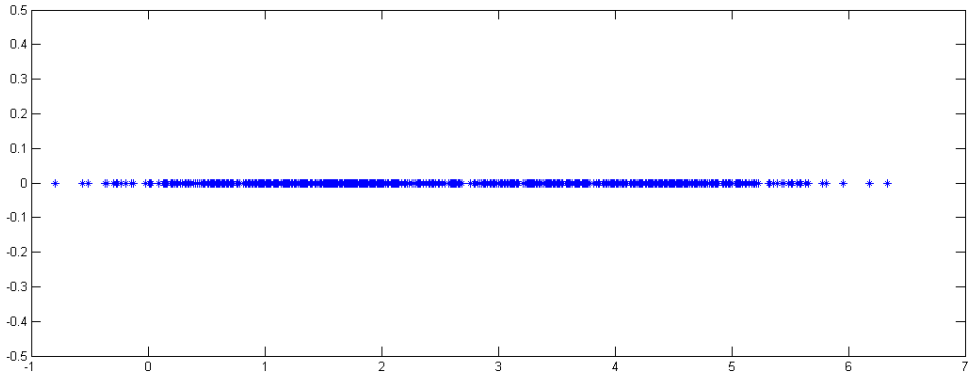
Correct Answer : B,D

3. When can we say that we have enough information/knowledge about something ?

A. If we have a large number of data points in the dataset.
B. If the data points cover a diverse range of information.
C. If the dataset contains a large number of features/attributes.
D. If the dataset contains less number of redundant data points.

Correct Answer : B

4.



Choose the CORRECT options in accordance with the following graph:

A. Covar(X,Y) = 0
B. Var(X) > 0
C. Covar(X,Y) > 0
D. Var(Y) = 0

Correct Answer : A,D

5. Consider a 3X3 identity matrix is multiplied with a 3X1 matrix. The points in the resultant transformed matrix will change in

A. Magnitude only
B. Direction only
C. Both magnitude and direction
D. Neither magnitude nor dimension

Correct Answer : D

6. STATEMENT-1 : The need to standardise the attributes during PCA arises from the fact that PCA examines the variances in each attribute.
STATEMENT-2 : Dimensionality reduction techniques like PCA are one of the possible methods to reduce the computation time required to build the model.

A. Statement-1 is only true.
B. Statement-2 is only true.
C. Both statements are true.
D. Neither of the statements is true.

Correct Answer : C

7. Consider two features X and Y in a dataset. X measures the distance in kilometres and Y measures distance in miles. Will it be wise to remove one of the features completely from the dataset ?

8. Let A = [[3,4],[5,6]] (2X2 Matrix) and B = [[6],[7]] (2X1 Matrix). Consider the following transformation : AXB. This transformation has caused the points in B to change in:

A. Magnitude only
B. Direction only
C. Both magnitude and direction
D. Neither magnitude nor dimension

Correct Answer: C

9. Which of the following statements is/are CORRECT ?
   A. Eigenvectors are directions of the axes which contain the covariances.
   B. Eigenvector is a vector whose direction remains unchanged when a linear transformation is applied to it.
   C. Eigenvalues denote the amount of variance of the direction.
   D. Eigenvectors and Eigenvalues exist in pairs.

Correct Answer : A,B,C,D

10. Consider a matrix X = [[u,v],[p,q]] with eigenvalue 1 associated with eigenvector A = [[1],[2]]. Then the value of X^5.A is :
   A. [[u,v],[p,q]]
   B. [[u^5,v^5],[p^5,q^5]]
   C. [[1],[2]]
   D. Insufficient data

Correct Answer : C (Hint : X.A = 1.A)

11. Eigenvector of A = [[2,4],[3,1]] is :
   A. [[2],[3]]
   B. [[4],[1]]
   C. [[1],[-1]]
   D. [[3],[2]]

Correct Answer : C

12. Suppose instead of using all the features of the dataset, we reduce the data to k dimensions with PCA and then use these PCA projections as our features. Which of the following statements is correct?
   A. Higher ‘k’ means more regularisation
   B. Higher ‘k’ means less regularisation
   C. Value of ‘k’ is not related to regularisation

Correct Answer : B (Higher k would lead to less smoothening as we would be able to preserve more characteristics in data, hence less regularisation)

13. Select the option(s) which can be the principal components after applying PCA?
   A. (0.5, 0.5, 0.5, 0.5) and (0.71, 0.71, 0, 0)
   B. (0.5, 0.5, 0.5, 0.5) and (0, 0, -0.71, -0.71)
   C. (0.5, 0.5, 0.5, 0.5) and (0.5, 0.5, -0.5, -0.5)
   D. (0.5, 0.5, 0.5, 0.5) and (-0.5, -0.5, 0.5, 0.5)

Correct Answer : C,D

14. Select the correct statements.
   A. Each component is independent and unrelated to others.
   B. First principal component has the maximum information.
   C. PCA searches for directions that have smallest variance.
   D. Maximum number of principal components is less than equal to the total number of features.

Correct Answer : A,B,D