1. **What is the main goal of clustering?**  
   a) Supervised classification  
   b) Unsupervised grouping  
   c) Regression analysis  
   d) Dimensionality reduction  
   **Answer:** b) Unsupervised grouping
2. **Which of the following is a type of clustering algorithm?**  
   a) Linear regression  
   b) k-Nearest Neighbors (k-NN)  
   c) k-Means  
   d) Decision Trees  
   **Answer:** c) k-Means
3. **In k-Means clustering, what does the 'k' represent?**  
   a) Number of features  
   b) Number of clusters  
   c) Number of data points  
   d) Number of iterations  
   **Answer:** b) Number of clusters
4. **Which clustering algorithm is based on density?**  
   a) k-Means  
   b) Hierarchical Clustering  
   c) DBSCAN  
   d) Principal Component Analysis  
   **Answer:** c) DBSCAN
5. **Which of the following is true about clustering?**  
   a) It requires labeled data.  
   b) It is an unsupervised learning technique.  
   c) It always produces the same result regardless of initialization.  
   d) It works only for numerical data.  
   **Answer:** b) It is an unsupervised learning technique.
6. **What is the main disadvantage of k-Means clustering?**  
   a) It works only with categorical data.  
   b) It is sensitive to the choice of initial centroids.  
   c) It cannot handle a large number of data points.  
   d) It does not require a predefined number of clusters.  
   **Answer:** b) It is sensitive to the choice of initial centroids.
7. **Which of the following clustering methods builds a hierarchy of clusters?**  
   a) k-Means  
   b) DBSCAN  
   c) Hierarchical Clustering  
   d) Spectral Clustering  
   **Answer:** c) Hierarchical Clustering
8. **What does the silhouette score measure in clustering?**  
   a) The speed of the algorithm  
   b) The similarity within clusters and separation between clusters  
   c) The number of clusters in the data  
   d) The computational cost of the algorithm  
   **Answer:** b) The similarity within clusters and separation between clusters
9. **Which of the following is true for DBSCAN?**  
   a) It requires the number of clusters as input.  
   b) It can identify clusters of arbitrary shape.  
   c) It is sensitive to the choice of initial centroids.  
   d) It does not work with noisy data.  
   **Answer:** b) It can identify clusters of arbitrary shape.
10. **Agglomerative clustering belongs to which category of clustering?**  
    a) Partitioning methods  
    b) Density-based methods  
    c) Hierarchical methods  
    d) Grid-based methods  
    **Answer:** c) Hierarchical methods
11. **Which distance metric is commonly used in clustering?**  
    a) Manhattan distance  
    b) Euclidean distance  
    c) Cosine similarity  
    d) All of the above  
    **Answer:** d) All of the above
12. **In hierarchical clustering, what does the dendrogram represent?**  
    a) A graph of initial centroids  
    b) A tree diagram showing clusters and their relationships  
    c) The error of the clustering process  
    d) The decision boundary of the clusters  
    **Answer:** b) A tree diagram showing clusters and their relationships
13. **Which of the following clustering methods is most effective for large datasets?**  
    a) k-Means  
    b) DBSCAN  
    c) Agglomerative clustering  
    d) Fuzzy c-Means  
    **Answer:** a) k-Means
14. **What is the main difference between k-Means and k-Medoids?**  
    a) k-Medoids is faster than k-Means.  
    b) k-Medoids is less sensitive to outliers than k-Means.  
    c) k-Means is based on density, while k-Medoids is not.  
    d) k-Means uses categorical data, while k-Medoids does not.  
    **Answer:** b) k-Medoids is less sensitive to outliers than k-Means.
15. **Which of the following techniques is used to determine the optimal number of clusters in k-Means?**  
    a) Silhouette analysis  
    b) Elbow method  
    c) Gap statistic  
    d) All of the above  
    **Answer:** d) All of the above
16. **What is the Elbow Method used for in clustering?**  
    a) Choosing the distance metric  
    b) Determining the optimal number of clusters  
    c) Visualizing cluster centroids  
    d) Reducing the dimensionality of data  
    **Answer:** b) Determining the optimal number of clusters
17. **In the Elbow Method, what does the "elbow" in the graph represent?**  
    a) The point of highest distortion  
    b) The cluster with the smallest size  
    c) The point where adding more clusters does not significantly reduce distortion  
    d) The cluster with the highest density  
    **Answer:** c) The point where adding more clusters does not significantly reduce distortion
18. **Which metric is typically plotted on the y-axis in the Elbow Method?**  
    a) Number of clusters  
    b) Inertia or Within-Cluster Sum of Squares (WCSS)  
    c) Silhouette score  
    d) Density of clusters  
    **Answer:** b) Inertia or Within-Cluster Sum of Squares (WCSS)
19. **On the x-axis of the Elbow Method graph, what is plotted?**  
    a) Number of features  
    b) Number of clusters (k)  
    c) Number of iterations  
    d) Distance between centroids  
    **Answer:** b) Number of clusters (k)
20. **The Elbow Method is most commonly used with which clustering algorithm?**  
    a) DBSCAN  
    b) Hierarchical clustering  
    c) k-Means clustering  
    d) Fuzzy c-Means  
    **Answer:** c) k-Means clustering
21. **What happens to the WCSS value as the number of clusters increases in the Elbow Method?**  
    a) It increases linearly.  
    b) It decreases exponentially.  
    c) It decreases but at a diminishing rate.  
    d) It remains constant.  
    **Answer:** c) It decreases but at a diminishing rate.
22. **Why is the Elbow Method not always effective?**  
    a) It requires labeled data.  
    b) The elbow point may not be clearly visible in some datasets.  
    c) It only works for density-based clustering algorithms.  
    d) It is computationally expensive.  
    **Answer:** b) The elbow point may not be clearly visible in some datasets.
23. **What is inertia in the context of the Elbow Method?**  
    a) The maximum distance between cluster centroids  
    b) The sum of squared distances of samples to their nearest cluster center  
    c) The average silhouette score of all clusters  
    d) The density of the largest cluster  
    **Answer:** b) The sum of squared distances of samples to their nearest cluster center
24. **Which of the following statements about the Elbow Method is true?**  
    a) It can only be used for numerical data.  
    b) It identifies the optimal number of clusters by minimizing silhouette score.  
    c) It relies on visual inspection to determine the best number of clusters.  
    d) It is based on maximizing the sum of distances within clusters.  
    **Answer:** c) It relies on visual inspection to determine the best number of clusters.
25. **If the Elbow Method graph does not have a distinct "elbow," what can be done?**  
    a) Increase the number of features.  
    b) Use an alternative method like the Silhouette Score or Gap Statistic.  
    c) Increase the number of clusters indefinitely.  
    d) Switch to supervised learning.  
    **Answer:** b) Use an alternative method like the Silhouette Score or Gap Statistic.
26. **What is one limitation of the Elbow Method?**  
    a) It cannot be used with categorical data.  
    b) It assumes clusters are of equal size and density.  
    c) It requires computationally expensive matrix operations.  
    d) It does not work with large datasets.  
    **Answer:** b) It assumes clusters are of equal size and density.
27. **Which method is complementary to the Elbow Method for selecting the optimal number of clusters?**  
    a) Principal Component Analysis (PCA)  
    b) Silhouette Analysis  
    c) t-SNE  
    d) Decision Trees  
    **Answer:** b) Silhouette Analysis
28. **What does a sharp "elbow" in the Elbow Method graph signify?**  
    a) Poor clustering results  
    b) Optimal number of clusters  
    c) Overfitting of the clustering algorithm  
    d) Large within-cluster variance  
    **Answer:** b) Optimal number of clusters
29. **In practice, why might the Elbow Method yield suboptimal results?**  
    a) Clusters may not be spherical in shape.  
    b) The method assumes an infinite number of clusters.  
    c) It requires prior knowledge of the data.  
    d) It only works with hierarchical clustering.  
    **Answer:** a) Clusters may not be spherical in shape.
30. **Which of the following scenarios could make identifying the "elbow" challenging?**  
    a) The WCSS values decrease linearly without a sharp bend.  
    b) There is a large amount of noise in the data.  
    c) The clusters overlap significantly.  
    d) All of the above.  
    **Answer:** d) All of the above.
31. **What does Euclidean Distance measure in machine learning?**  
    a) The difference between probabilities  
    b) The straight-line distance between two points in space  
    c) The similarity between two datasets  
    d) The area under the curve of a model  
    **Answer:** b) The straight-line distance between two points in space
32. **What is the formula for Euclidean Distance between two points A(x1,y1)A(x\_1, y\_1)A(x1​,y1​) and B(x2,y2)B(x\_2, y\_2)B(x2​,y2​) in a 2D space?**  
    a) ∣x2−x1∣+∣y2−y1∣|x\_2 - x\_1| + |y\_2 - y\_1|∣x2​−x1​∣+∣y2​−y1​∣  
    b) (x2−x1)2+(y2−y1)2\sqrt{(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2}(x2​−x1​)2+(y2​−y1​)2​  
    c) (x2−x1)2+(y2−y1)2(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2(x2​−x1​)2+(y2​−y1​)2  
    d) (x2−x1)+(y2−y1)2\frac{(x\_2 - x\_1) + (y\_2 - y\_1)}{2}2(x2​−x1​)+(y2​−y1​)​  
    **Answer:** b) (x2−x1)2+(y2−y1)2\sqrt{(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2}(x2​−x1​)2+(y2​−y1​)2​
33. **Which type of data is required to calculate Euclidean Distance?**  
    a) Categorical data  
    b) Numerical data  
    c) Ordinal data  
    d) Text data  
    **Answer:** b) Numerical data
34. **Euclidean Distance is a special case of which distance metric?**  
    a) Manhattan Distance  
    b) Minkowski Distance  
    c) Cosine Distance  
    d) Hamming Distance  
    **Answer:** b) Minkowski Distance
35. **What is the value of Euclidean Distance if two points are identical?**  
    a) 1  
    b) 0  
    c) Infinity  
    d) Undefined  
    **Answer:** b) 0
36. **In machine learning, Euclidean Distance is commonly used in which of the following algorithms?**  
    a) Linear regression  
    b) k-Means clustering  
    c) Naive Bayes  
    d) Decision Trees  
    **Answer:** b) k-Means clustering
37. **What happens to Euclidean Distance when data is scaled to a higher magnitude (e.g., from meters to kilometers)?**  
    a) The distance increases proportionally.  
    b) The distance remains the same.  
    c) The distance decreases.  
    d) The distance becomes negative.  
    **Answer:** a) The distance increases proportionally.
38. **Which of the following issues arises when using Euclidean Distance with high-dimensional data?**  
    a) Overfitting  
    b) The curse of dimensionality  
    c) Underfitting  
    d) Model bias  
    **Answer:** b) The curse of dimensionality
39. **What is the Euclidean Distance between A(0,0)A(0, 0)A(0,0) and B(3,4)B(3, 4)B(3,4)?**  
    a) 5  
    b) 7  
    c) 9  
    d) 6  
    **Answer:** a) 5
40. **How can Euclidean Distance be normalized to prevent one feature from dominating?**  
    a) Standardize or scale the features before calculating the distance.  
    b) Increase the dimensionality of the data.  
    c) Use categorical encoding for numerical data.  
    d) Ignore the outliers in the dataset.  
    **Answer:** a) Standardize or scale the features before calculating the distance.
41. **Which distance metric is more appropriate when features are measured on different scales?**  
    a) Euclidean Distance  
    b) Cosine Similarity  
    c) Manhattan Distance  
    d) Normalized Euclidean Distance  
    **Answer:** d) Normalized Euclidean Distance
42. **For which of the following cases is Euclidean Distance not suitable?**  
    a) High-dimensional data  
    b) Sparse data  
    c) Data with features on different scales  
    d) All of the above  
    **Answer:** d) All of the above
43. **If Euclidean Distance is used as the similarity metric in clustering, what is its primary limitation?**  
    a) It assumes all clusters have equal density.  
    b) It cannot handle missing values.  
    c) It is computationally expensive.  
    d) It cannot handle labeled data.  
    **Answer:** a) It assumes all clusters have equal density.
44. **What is the relationship between Euclidean Distance and Pythagoras' theorem?**  
    a) Euclidean Distance is derived from Pythagoras' theorem.  
    b) Euclidean Distance contradicts Pythagoras' theorem.  
    c) Euclidean Distance is unrelated to Pythagoras' theorem.  
    d) Pythagoras' theorem is a subset of Euclidean Distance.  
    **Answer:** a) Euclidean Distance is derived from Pythagoras' theorem.
45. **What is the Euclidean Distance in 3D space between two points A(x1,y1,z1)A(x\_1, y\_1, z\_1)A(x1​,y1​,z1​) and B(x2,y2,z2)B(x\_2, y\_2, z\_2)B(x2​,y2​,z2​)?**  
    a) (x2−x1)2+(y2−y1)2\sqrt{(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2}(x2​−x1​)2+(y2​−y1​)2​  
    b) (x2−x1)2+(y2−y1)2+(z2−z1)2\sqrt{(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2 + (z\_2 - z\_1)^2}(x2​−x1​)2+(y2​−y1​)2+(z2​−z1​)2​  
    c) ∣x2−x1∣+∣y2−y1∣+∣z2−z1∣|x\_2 - x\_1| + |y\_2 - y\_1| + |z\_2 - z\_1|∣x2​−x1​∣+∣y2​−y1​∣+∣z2​−z1​∣  
    d) (x2−x1)2+(y2−y1)2+(z2−z1)2(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2 + (z\_2 - z\_1)^2(x2​−x1​)2+(y2​−y1​)2+(z2​−z1​)2  
    **Answer:** b) (x2−x1)2+(y2−y1)2+(z2−z1)2\sqrt{(x\_2 - x\_1)^2 + (y\_2 - y\_1)^2 + (z\_2 - z\_1)^2}(x2​−x1​)2+(y2​−y1​)2+(z2​−z1​)2​
46. **What type of learning algorithm is k-Means?**  
    a) Supervised Learning  
    b) Unsupervised Learning  
    c) Semi-Supervised Learning  
    d) Reinforcement Learning  
    **Answer:** b) Unsupervised Learning
47. **What does the "k" in k-Means represent?**  
    a) The number of features  
    b) The number of clusters  
    c) The number of iterations  
    d) The number of data points  
    **Answer:** b) The number of clusters
48. **What is the primary goal of the k-Means algorithm?**  
    a) To maximize the distance between clusters  
    b) To minimize the within-cluster sum of squares (WCSS)  
    c) To sort data in ascending order  
    d) To find the nearest neighbor  
    **Answer:** b) To minimize the within-cluster sum of squares (WCSS)
49. **Which distance metric is typically used in the k-Means algorithm?**  
    a) Manhattan Distance  
    b) Euclidean Distance  
    c) Cosine Similarity  
    d) Hamming Distance  
    **Answer:** b) Euclidean Distance
50. **k-Means works best with data that is:**  
    a) Categorical  
    b) Numerical and well-separated  
    c) Sparse and categorical  
    d) Highly imbalanced  
    **Answer:** b) Numerical and well-separated
51. **How are the initial centroids in k-Means typically chosen?**  
    a) Randomly from the dataset  
    b) Based on the mean of all points  
    c) Using the Silhouette score  
    d) Based on hierarchical clustering  
    **Answer:** a) Randomly from the dataset
52. **What is the stopping criterion for the k-Means algorithm?**  
    a) All clusters have equal sizes  
    b) No data point changes its cluster assignment  
    c) Centroids reach the maximum distance  
    d) The number of clusters changes  
    **Answer:** b) No data point changes its cluster assignment
53. **Which of the following can affect the results of the k-Means algorithm?**  
    a) The choice of k  
    b) The choice of initial centroids  
    c) The scaling of features  
    d) All of the above  
    **Answer:** d) All of the above
54. **What is the complexity of the k-Means algorithm for nnn data points, kkk clusters, and ttt iterations?**  
    a) O(k×n2)O(k \times n^2)O(k×n2)  
    b) O(n×k×t)O(n \times k \times t)O(n×k×t)  
    c) O(n3)O(n^3)O(n3)  
    d) O(k×n)O(k \times n)O(k×n)  
    **Answer:** b) O(n×k×t)O(n \times k \times t)O(n×k×t)
55. **How can the problem of k-Means converging to a local minimum be addressed?**  
    a) Use the Elbow Method  
    b) Run the algorithm multiple times with different initial centroids  
    c) Use a different clustering algorithm  
    d) Increase the number of features  
    **Answer:** b) Run the algorithm multiple times with different initial centroids
56. **Which of the following is a limitation of k-Means clustering?**  
    a) It works only for small datasets.  
    b) It is sensitive to outliers.  
    c) It can only handle categorical data.  
    d) It does not converge to a solution.  
    **Answer:** b) It is sensitive to outliers.
57. **What is k-Means++?**  
    a) A supervised version of k-Means  
    b) A method to select initial centroids more effectively  
    c) A variant of k-Means that uses Manhattan Distance  
    d) A hierarchical clustering method  
    **Answer:** b) A method to select initial centroids more effectively
58. **Which evaluation metric can be used to assess the performance of k-Means clustering?**  
    a) Confusion Matrix  
    b) Silhouette Score  
    c) Precision and Recall  
    d) Root Mean Squared Error  
    **Answer:** b) Silhouette Score
59. **What does the within-cluster sum of squares (WCSS) measure in k-Means?**  
    a) The variance between clusters  
    b) The total squared distance of points to their cluster centroids  
    c) The distance between the centroids of two clusters  
    d) The maximum distance within a cluster  
    **Answer:** b) The total squared distance of points to their cluster centroids
60. **When is k-Means not a suitable algorithm to use?**  
    a) When clusters are of unequal size  
    b) When clusters are non-spherical  
    c) When the data contains a lot of noise  
    d) All of the above  
    **Answer:** d) All of the above
61. **What type of learning algorithm is hierarchical clustering?**  
    a) Supervised Learning  
    b) Unsupervised Learning  
    c) Semi-Supervised Learning  
    d) Reinforcement Learning  
    **Answer:** b) Unsupervised Learning
62. **Which of the following is a characteristic of hierarchical clustering?**  
    a) Requires the number of clusters to be specified in advance  
    b) Builds a tree-like structure of clusters  
    c) Always results in spherical clusters  
    d) Uses gradient descent for optimization  
    **Answer:** b) Builds a tree-like structure of clusters
63. **What is the output of hierarchical clustering?**  
    a) A confusion matrix  
    b) A dendrogram  
    c) A silhouette score  
    d) A distance matrix  
    **Answer:** b) A dendrogram
64. **Hierarchical clustering can be divided into two main types. What are they?**  
    a) Agglomerative and Divisive  
    b) Supervised and Unsupervised  
    c) Density-based and Grid-based  
    d) Parametric and Non-parametric  
    **Answer:** a) Agglomerative and Divisive
65. **In agglomerative hierarchical clustering, the process starts with:**  
    a) All points in a single cluster  
    b) Each data point as its own cluster  
    c) Clusters based on random initialization  
    d) Predefined clusters based on k  
    **Answer:** b) Each data point as its own cluster
66. **Which linkage criterion measures the distance between the closest points of two clusters?**  
    a) Complete Linkage  
    b) Single Linkage  
    c) Average Linkage  
    d) Centroid Linkage  
    **Answer:** b) Single Linkage
67. **Which of the following is a disadvantage of hierarchical clustering?**  
    a) It cannot handle numerical data.  
    b) It requires prior knowledge of the number of clusters.  
    c) It is computationally expensive for large datasets.  
    d) It cannot represent clusters visually.  
    **Answer:** c) It is computationally expensive for large datasets.
68. **In divisive hierarchical clustering, the process starts with:**  
    a) Each data point as its own cluster  
    b) All data points in a single cluster  
    c) Randomly selected clusters  
    d) A predetermined number of clusters  
    **Answer:** b) All data points in a single cluster
69. **Which metric is typically used to calculate the similarity between clusters in hierarchical clustering?**  
    a) Euclidean Distance  
    b) Manhattan Distance  
    c) Cosine Similarity  
    d) Any of the above, depending on the application  
    **Answer:** d) Any of the above, depending on the application
70. **What does a dendrogram represent in hierarchical clustering?**  
    a) The distances between centroids of clusters  
    b) The hierarchical relationship between data points and clusters  
    c) The number of clusters formed at each iteration  
    d) The silhouette score for each cluster  
    **Answer:** b) The hierarchical relationship between data points and clusters
71. **What is the time complexity of agglomerative hierarchical clustering for nnn data points?**  
    a) O(n)O(n)O(n)  
    b) O(nlog⁡n)O(n \log n)O(nlogn)  
    c) O(n2)O(n^2)O(n2)  
    d) O(n3)O(n^3)O(n3)  
    **Answer:** d) O(n3)O(n^3)O(n3)
72. **Which of the following linkage methods considers the maximum distance between points in two clusters?**  
    a) Single Linkage  
    b) Complete Linkage  
    c) Average Linkage  
    d) Ward’s Linkage  
    **Answer:** b) Complete Linkage
73. **When using hierarchical clustering, how do you decide the number of clusters?**  
    a) By setting a fixed threshold  
    b) By cutting the dendrogram at a specific height  
    c) By randomly assigning clusters  
    d) By calculating the mean of the distances  
    **Answer:** b) By cutting the dendrogram at a specific height
74. **What is Ward’s method in hierarchical clustering?**  
    a) A linkage method that minimizes the total within-cluster variance  
    b) A method to merge the largest clusters first  
    c) A technique that maximizes the silhouette score  
    d) A clustering algorithm based on density  
    **Answer:** a) A linkage method that minimizes the total within-cluster variance
75. **Hierarchical clustering is more appropriate when:**  
    a) The number of clusters is known in advance.  
    b) The dataset is large with many data points.  
    c) The goal is to analyze relationships and sub-clusters within data.  
    d) The clusters are spherical and well-separated.  
    **Answer:** c) The goal is to analyze relationships and sub-clusters within data.
76. **What is unsupervised learning?**  
    a) A type of learning with labeled data  
    b) A type of learning without labeled data  
    c) A type of learning with reinforcement signals  
    d) A supervised variant for small datasets  
    **Answer:** b) A type of learning without labeled data
77. **Which of the following is an example of an unsupervised learning algorithm?**  
    a) Logistic Regression  
    b) k-Means Clustering  
    c) Decision Trees  
    d) Support Vector Machines  
    **Answer:** b) k-Means Clustering
78. **What is the primary goal of unsupervised learning?**  
    a) Predict a target variable  
    b) Discover hidden patterns in data  
    c) Classify data into predefined labels  
    d) Minimize the loss function  
    **Answer:** b) Discover hidden patterns in data
79. **Which of the following is NOT an application of unsupervised learning?**  
    a) Customer segmentation  
    b) Image compression  
    c) Spam email detection  
    d) Anomaly detection  
    **Answer:** c) Spam email detection
80. **Which of the following is a clustering technique in unsupervised learning?**  
    a) k-Means  
    b) Linear Regression  
    c) Random Forest  
    d) Gradient Boosting  
    **Answer:** a) k-Means
81. **Which of the following algorithms is used for dimensionality reduction?**  
    a) PCA (Principal Component Analysis)  
    b) k-Nearest Neighbors  
    c) Naive Bayes  
    d) Gradient Descent  
    **Answer:** a) PCA (Principal Component Analysis)
82. **What is the difference between supervised and unsupervised learning?**  
    a) Supervised learning requires labeled data, while unsupervised learning does not.  
    b) Supervised learning is used for clustering, while unsupervised learning is used for classification.  
    c) Unsupervised learning always produces better results than supervised learning.  
    d) Both use labeled data, but in different ways.  
    **Answer:** a) Supervised learning requires labeled data, while unsupervised learning does not.
83. **What is the Silhouette Score used for?**  
    a) Evaluating regression models  
    b) Assessing the quality of clusters in unsupervised learning  
    c) Measuring accuracy in supervised learning  
    d) Optimizing hyperparameters in a neural network  
    **Answer:** b) Assessing the quality of clusters in unsupervised learning
84. **Which method is commonly used to evaluate clustering performance?**  
    a) R-squared value  
    b) Confusion matrix  
    c) Elbow Method  
    d) Precision-Recall Curve  
    **Answer:** c) Elbow Method
85. **Which of the following is an example of hierarchical clustering?**  
    a) k-Means  
    b) DBSCAN  
    c) Agglomerative Clustering  
    d) Random Forest  
    **Answer:** c) Agglomerative Clustering
86. **Which of the following is true about dimensionality reduction in unsupervised learning?**  
    a) It is only applicable to labeled datasets.  
    b) It helps reduce computational cost and noise in data.  
    c) It increases the number of features in the dataset.  
    d) It guarantees better clustering results.  
    **Answer:** b) It helps reduce computational cost and noise in data.
87. **Which type of unsupervised learning algorithm is used for detecting outliers?**  
    a) Regression  
    b) Density-based clustering (e.g., DBSCAN)  
    c) Reinforcement learning  
    d) Ensemble methods  
    **Answer:** b) Density-based clustering (e.g., DBSCAN)
88. **What is the primary limitation of unsupervised learning?**  
    a) It cannot handle large datasets.  
    b) It requires labeled data for training.  
    c) It is difficult to evaluate the results without labeled data.  
    d) It only works with numerical data.  
    **Answer:** c) It is difficult to evaluate the results without labeled data.
89. **Which of the following is true about feature scaling in unsupervised learning?**  
    a) It is unnecessary because clustering algorithms handle scaling automatically.  
    b) It is only needed for regression models.  
    c) It is essential to ensure all features contribute equally to the model.  
    d) It should always use one-hot encoding.  
    **Answer:** c) It is essential to ensure all features contribute equally to the model.
90. **Which of the following is a challenge in unsupervised learning?**  
    a) Overfitting the training data  
    b) Choosing the optimal number of clusters  
    c) Handling labeled data during training  
    d) Balancing training and validation datasets  
    **Answer:** b) Choosing the optimal number of clusters