1. **Which of the following is NOT a distance-based method for classification?**
   * (a) K-Nearest Neighbors (K-NN)
   * (b) Decision Trees ✅
   * (c) Euclidean Distance
   * (d) Mahalanobis Distance  
     **✅ Correct Answer: (b) Decision Trees**  
     *(Decision Trees do not rely on distance metrics.)*
2. **In Linear Regression, the objective is to minimize which of the following?**
   * (a) Classification error
   * (b) Cross-entropy loss
   * (c) Sum of squared residuals ✅
   * (d) Logloss  
     **✅ Correct Answer: (c) Sum of squared residuals**  
     *(This is the loss function minimized in linear regression.)*
3. **Association Rule Mining for Market Basket Analysis is based on the concept of:**
   * (a) Supervised Learning
   * (b) Unsupervised Learning ✅
   * (c) Reinforcement Learning
   * (d) None of the above  
     **✅ Correct Answer: (b) Unsupervised Learning**  
     *(No labels are used in market basket analysis.)*
4. **The Letter-Grade Score in an examination is an example of:**
   * (a) Categorical and nominal variable
   * (b) Categorical and ordinal variable ✅
   * (c) Discrete quantitative variable
   * (d) Continuous quantitative variable  
     **✅ Correct Answer: (b) Categorical and ordinal variable**  
     *(Letter grades have a meaningful order but are not numerical.)*
5. **What is the primary objective of regression in machine learning?**
   * (a) To classify data into distinct categories
   * (b) To predict continuous numerical values ✅
   * (c) To reduce the dimensionality of data
   * (d) To group similar data points together  
     **✅ Correct Answer: (b) To predict continuous numerical values**
6. **Which of the following models can be used for multi-class classification?**
   * (a) Logistic Regression
   * (b) Decision Trees
   * (c) Support Vector Machine (SVM)
   * (d) All of the above ✅  
     **✅ Correct Answer: (d) All of the above**  
     *(All can be extended for multi-class classification.)*
7. **What is the main advantage of sparse modeling?**
   * (a) It reduces the need for large amounts of training data.
   * (b) It improves model interpretability by using only a small subset of features. ✅
   * (c) It increases computational complexity.
   * (d) It leads to overfitting.  
     **✅ Correct Answer: (b) It improves model interpretability by using only a small subset of features.**
8. **What is a key challenge in time-series modeling?**
   * (a) Identifying the most suitable regression model
   * (b) Handling seasonality and trend patterns ✅
   * (c) Predicting categorical outcomes
   * (d) Managing high-dimensional data  
     **✅ Correct Answer: (b) Handling seasonality and trend patterns**
9. **Transfer learning is useful because:**
   * (a) It reduces the need for large datasets in new tasks ✅
   * (b) It speeds up model training by reusing pre-trained features ✅
   * (c) It improves performance on tasks with limited labeled data ✅
   * (d) All of the above ✅  
     **✅ Correct Answer: (d) All of the above**
10. **Meta-learning focuses on:**
    * (a) Learning how to learn ✅
    * (b) Optimizing hardware performance
    * (c) Designing new activation functions
    * (d) Memorizing large datasets  
      **✅ Correct Answer: (a) Learning how to learn**
11. **What is a primary advantage of federated learning?**
    * (a) Reduces model complexity
    * (b) Enhances data privacy ✅
    * (c) Increases server storage requirements
    * (d) Centralizes all training data  
      **✅ Correct Answer: (b) Enhances data privacy**
12. **In Linear Regression, the objective is to minimize which of the following?**
    * (a) Classification error
    * (b) Cross-entropy loss
    * (c) Sum of squared residuals ✅
    * (d) Log loss  
      **✅ Correct Answer: (c) Sum of squared residuals**
13. **Association Rule Mining for Market Basket analysis is based on the concept of:**
    * (a) Supervised Learning
    * (b) Unsupervised Learning ✅
    * (c) Reinforcement Learning
    * (d) None of the above  
      **✅ Correct Answer: (b) Unsupervised Learning**
14. **Which of the following is a supervised learning algorithm?**
    * (a) K-means clustering
    * (b) Principal Component Analysis
    * (c) Linear Regression ✅
    * (d) Apriori algorithm  
      **✅ Correct Answer: (c) Linear Regression**
15. **Which algorithm is distance-based?**
    * (a) Decision Tree
    * (b) K-Nearest Neighbors (KNN) ✅
    * (c) Naive Bayes
    * (d) Support Vector Machine (SVM)  
      **✅ Correct Answer: (b) K-Nearest Neighbors (KNN)**
16. **Which of the following is NOT a linear model?**
    * (a) Linear Regression
    * (b) Logistic Regression
    * (c) Decision Tree ✅
    * (d) Ridge Regression  
      **✅ Correct Answer: (c) Decision Tree**
17. **The kernel trick is primarily used in which model?**
    * (a) Decision Trees
    * (b) Support Vector Machines (SVM) ✅
    * (c) K-Nearest Neighbors (KNN)
    * (d) Naive Bayes  
      **✅ Correct Answer: (b) Support Vector Machines (SVM)**
18. **What is the main advantage of using a Decision Tree?**
    * (a) It requires a lot of data preprocessing.
    * (b) It can handle both numerical and categorical data easily. ✅
    * (c) It always gives the most accurate results compared to other models.
    * (d) It is very complex and hard to interpret.  
      **✅ Correct Answer: (b) It can handle both numerical and categorical data easily.**
19. **Which clustering method is sensitive to the initial choice of centroids?**
    * (a) K-Means ✅
    * (b) DBSCAN
    * (c) Hierarchical Clustering
    * (d) Gaussian Mixture Model  
      **✅ Correct Answer: (a) K-Means**
20. **What does the silhouette coefficient measure in clustering?**
    * (a) The total number of clusters formed in the algorithm
    * (b) The consistency of cluster sizes
    * (c) The quality of the clustering by evaluating cohesion and separation ✅
    * (d) The computational time complexity of the clustering algorithm  
      **✅ Correct Answer: (c) The quality of the clustering by evaluating cohesion and separation**
21. **Which method is used to cluster data in an unsupervised learning setting?**
    * (a) K-Means ✅
    * (b) Linear Regression
    * (c) Support Vector Machine
    * (d) Decision Tree  
      **✅ Correct Answer: (a) K-Means**
22. **Which method is commonly used for matrix factorization?**
    * (a) Singular Value Decomposition (SVD) ✅
    * (b) K-Means Clustering
    * (c) Principal Component Analysis (PCA)
    * (d) Naive Bayes Classifier  
      **✅ Correct Answer: (a) Singular Value Decomposition (SVD)**
23. **Which of the following is NOT a model selection criterion?**
    * (a) AIC (Akaike Information Criterion)
    * (b) BIC (Bayesian Information Criterion)
    * (c) RMSE (Root Mean Square Error) ✅  
      **✅ Correct Answer: (c) RMSE**  
      *(RMSE is a performance metric, not a model selection criterion like AIC/BIC.)*