Statistics:

1. Descriptive Statistics:

- Mean, Median, Mode: Measures of central tendency help summarize and understand the distribution of data.
- Standard Deviation, Variance: Measures of dispersion provide insights into the spread of data points.

2. Inferential Statistics:

- Probability Distributions: Understanding probability distributions is essential for modeling uncertainties in data.
- Hypothesis Testing: Used to make inferences about population parameters based on sample data.

3. Statistical Learning:

- Regression Analysis: Modeling the relationship between variables.
- Classification: Assigning labels or categories to data points based on statistical models.

4. Sampling Techniques:

- Random Sampling: Ensures representative subsets for training and testing data.
- Bootstrapping: Resampling technique used for estimating the distribution of a statistic.

Linear Algebra:

1. Vectors and Matrices:

- Vectors: Representing data points and features.
- Matrices: Used for transformations, such as feature scaling and data manipulation.

2. Matrix Operations:

- Addition, Subtraction, Multiplication: Fundamental operations for manipulating data and parameters.
- Transpose: Flipping rows and columns, often used in calculations.

3. Eigenvalues and Eigenvectors:

- Principal Component Analysis (PCA): Dimensionality reduction technique.
- Spectral Clustering: Clustering algorithm based on eigenvectors.

4. Matrix Decompositions:

- Singular Value Decomposition (SVD): Used in latent semantic analysis and collaborative filtering.
- LU Decomposition: Solving linear equations efficiently.

5. Linear Transformations:

- Linear Maps: Used in linear regression and neural networks.
- Affine Transformations: Translation and scaling operations.

6. Linear Independence and Rank:

- Determining Rank: Assessing the number of linearly independent columns or rows in a

matrix.

- Rank-Nullity Theorem: Essential in understanding the dimensionality of the solution space.

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