Data Analyst Lab Exercises (100+)

☐ Basic Level (30+ Exercises)

Objective: Build a strong foundation in data collection, preparation, and exploratory analysis.

Excel & Spreadsheet Skills

- Clean and transform raw data using Excel functions.
- Create pivot tables for summarizing data.
- Build dashboards using slicers and charts.
- Use VLOOKUP, HLOOKUP, INDEX, MATCH.
- Automate reports using Excel Macros.

SQL Basics

- Write SQL queries to select and filter data.
- Use GROUP BY and aggregate functions.
- Perform JOIN operations on multiple tables.
- Write subqueries and nested SELECTs.
- Create and manipulate tables using DDL/DML.

Python for Data Analysis

- Load and inspect data using Pandas.
- Handle missing values and duplicates.
- Generate descriptive statistics.
- Visualize data using Matplotlib.
- Merge, group, and filter datasets.

Data Cleaning

- Identify and handle outliers.
- Normalize and scale data.
- Format datetime fields.
- Rename columns and reindex data.
- Convert categorical to numerical data.

☐ Intermediate Level (40+ Exercises)

Objective: Extract actionable insights through visualization, statistics, and business-focused analysis.

Data Visualization

- Create bar, pie, and line charts using Seaborn.
- Develop dashboards in Power BI/Tableau.
- Plot geospatial data on maps.
- Create heatmaps for correlation analysis.
- Build interactive filters and slicers.

Statistical Analysis

- Conduct hypothesis testing (t-test, chi-square).
- Analyze correlation and causation.
- Perform regression analysis.
- Calculate confidence intervals and p-values.
- Run ANOVA for multi-group comparison.

Advanced SQL

- Use window functions (ROW_NUMBER, RANK).
- Create complex CTEs (Common Table Expressions).
- Perform time-series operations in SQL.
- Write procedures and functions.
- Optimize slow queries using indexing.

Python Analysis Projects

- Analyze marketing campaign performance.
- Segment customers using clustering.
- Forecast product sales using linear regression.
- Build a KPI dashboard with Plotly Dash.
- Automate reporting with Python scripts.

☐ Advanced Level (40+ Exercises)

Objective: Master advanced analytics, modeling, and deployment of data-driven solutions.

Predictive Analytics

- Build classification models for churn prediction.
- Use logistic regression for binary outcomes.
- Perform feature selection and engineering.
- Evaluate models using ROC-AUC, confusion matrix.
- Compare model performance using cross-validation.

Big Data Tools

- Query data using Hive and Spark SQL.
- Use PySpark for distributed data processing.
- Perform ETL operations using Apache Airflow.
- Clean and analyze data in Google BigQuery.
- Connect BI tools with cloud databases.

Business Intelligence & Reporting

- Build complete dashboards in Power BI/Tableau.
- Implement row-level security in Power BI.
- Create data stories for business use-cases.
- Publish dashboards to Power BI service.
- Design executive reports for C-suite.

Domain-Focused Projects

- Retail: Analyze product performance & sales trends.
- Finance: Predict loan default and visualize risk.
- Healthcare: Analyze patient data and hospital KPIs.
- HR: Analyze attrition and build retention models.
- Logistics: Optimize delivery and forecast demand.

Capstone Projects

- Customer 360 dashboard for a retail client.
- Predictive analysis for e-commerce cart abandonment.
- Sales forecasting dashboard with seasonal trends.
- Real-time data dashboard using APIs and Python.

- End-to-end data pipeline from raw data to BI dashboard.