🧪 Linear Regression Project-Based Exam

🎯 Objective:

Students will build, evaluate, and interpret a linear regression model using a real-world dataset or one you provide.

📄 Exam Structure

Title:

Linear Regression: Predictive Modeling Project

Total Marks: 100

Time: 1–2 days (adjustable based on level)

Deliverables:

- Source code (Python)
- Final report or Jupyter notebook
- Visualizations
- Interpretation of results

✅ Instructions

📦 Part 1: Data Preparation (20 marks)

- Load the dataset (e.g., CSV file)
- Explore data: check for missing values, datatypes, and basic stats

- Plot relationships between features and target using scatter plots or correlation heatmaps

Dataset example: Predict house prices

📈 Part 2: Model Building (25 marks)

- Select appropriate input features (optional: feature scaling or encoding)
- Fit a **Simple or Multiple Linear Regression** model
- Show the equation of the regression line using model coefficients

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🧪 Part 3: Model Evaluation (25 marks)

- Evaluate model performance using:
    - R^2 (coefficient of determination)
    - MAE / MSE / RMSE
- Check residual plots to validate assumptions (linearity, homoscedasticity, etc.)
- Comment on underfitting or overfitting

📊 Part 4: Interpretation (20 marks)

- Interpret model coefficients (which features matter most?)
- Explain practical meaning of intercept and slope
- Describe how predictions would change if feature X increases

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💬 Part 5: Report / Presentation (10 marks)

- Summary of approach
- Key findings and limitations
- Model performance summary
- Suggest possible improvements (e.g., polynomial features, regularization)

🧠 Bonus Options (Optional +10 marks)

- Use polynomial regression if data is nonlinear
- Compare with other models (e.g., decision tree)
- Deploy as a web app (e.g., Flask or Streamlit)