Explore the effects of regularization on logistic regression models in a classification problem.

Choose a dataset: Select a real-world dataset (i.e., from Kaggle) with multiple input features and a binary target variable. The dataset should have a sufficient number of samples and features to demonstrate the effects of regularization.

Data preprocessing: Preprocess the dataset by performing missing value imputation, feature scaling, and encoding categorical variables. Split the dataset into training and validation sets.

Fit an unregularized logistic regression model: Train a logistic regression model on the training dataset and evaluate its performance on the validation set.

Apply L1 (Lasso), L2 (Ridge), and Elastic Net regularization: Train Lasso, Ridge, and Elastic Net logistic regression models, experimenting with different regularization strengths (C, inverse of regularization strength) and, for Elastic Net, the L1/L2 ratio. Evaluate the models' performance on the validation set.

Model comparison and discussion: Compare the performance of the unregularized and regularized logistic regression models, and discuss the trade-offs between model complexity, generalization, and the effects of regularization on model coefficients.

Feature selection: Investigate the effect of regularization on feature selection by comparing the coefficients of the different models.