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MATH 4780 Final Project Proposal
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Project Title: What factors affect passengers' ability to survive the Titanic?

The 1912 sinking of the Titanic is one of the most infamous tragedies in history, and our final project aims to employ regression diagnostics to enhance the analysis of the survival patterns aboard the ship. Specifically, we are interested in examining the effects of passengers' age, sex, ticket class (1st, 2nd, and 3rd), number of siblings/spouses aboard ship, number of parents/children aboard ship, cabin number, and port of embarkation (the regressors) on their ability to survive the shipwreck (the response). By using Multiple Linear Regression techniques, this project aims to unravel the relationships between the named variables and survival on the Titanic. The insights gained can have broader real-world applications in optimizing decision-making skills and emergency response protocol. In this way, this project not only contributes to predictive modeling but also shows how data from historical events has social implications.

To perform our analysis, it will also benefit us to investigate whether eliminating some regressors results in any changes in our model. For example, we predict that the port of embarkation will most likely have little effect on the probability of survival. We can also identify influential outliers by examining Cook's distance, leverage, and studentized residuals. These can greatly affect the model's performance in terms of precision and accuracy. Moreover, evaluating the overall model fit using R-squared and adjusted R-squared values will indicate the proportion of variability in the response variable explained by the model. A significant challenge for this project will be in assessing whether a linearity assumption is valid by examining residual plots against each predictor variable. Non-linear patterns may indicate a need for transformations of variables or the inclusion of higher-order terms.