

MA477: Data Science
Lesson 7 Board Sheet — 23 January 2026
 United States Military Academy, West Point
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1 Qualitative Predictors Lesson Objectives

- Use qualitative predictors in a linear regression model.
- Interpret the coefficient of an interaction term in a linear regression model.
- Employ polynomial regression to accommodate nonlinear relationships

Discussion Questions

1. How do we integrate categorical variables into linear models?
2. Compare and contrast the left model to the right model - what does the interaction term do?
3. Interpret the regression coefficient for income vs. debt considering the interaction term of being a student.
4. Why is a polynomial regression model still considered a linear model?
5. What are the risks of using a very high-degree polynomial in regression?

98 3. Linear Regression

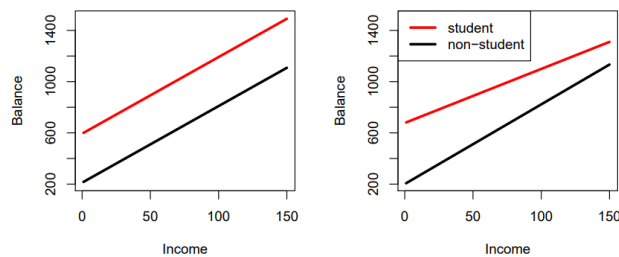


FIGURE 3.7. For the `Credit` data, the least squares lines are shown for prediction of `balance` from `income` for students and non-students. Left: The model (3.34) was fit. There is no interaction between `income` and `student`. Right: The model (3.35) was fit. There is an interaction term between `income` and `student`.

Figure 1: Interaction Term