

## Admin Notes / Agenda

- Zero Point Quiz
- TEE Review Signup
- Project Prep Schedule

## Project Prep Schedule: End of Class Each Day

- Lesson 58 / 03DEC25 - Draft Proposal Complete
- Lesson 59 / 04DEC25 - Slides 2 and 3 complete (Research Question, Background, and Modeling Decisions)
- Lesson 61 / 08DEC25 - Slides 4 and 5 complete (Model Validation, Assessment, and Real World Implications)
- Lesson 62 / 09DEC25 - RXL prep and brief another team

# 1 Key Definitions for What If

Linear programming models rely on several fundamental assumptions that ensure the relationships between variables remain linear and mathematically tractable:

1. **binding:** A constraint is binding if the left-hand side and the right-hand side of the constraint are equal when the optimal values of the variables are substituted into the constraint.
2. **non-binding:** A constraint is non-binding if the left-hand side and the right-hand side of the constraint are unequal when the optimal values of the decision variables are substituted into the constraint.
3. **Shadow Price:** A shadow price is how much the objective function value is increased if the right-hand side value of a binding constraint is increased by 1, as long as it remains a binding constraint.
4. **What if: Interpret slopes of the objective:** For the objective function  $Z = c_1x_1 + c_2x_2$ , each pair  $(c_1, c_2)$  defines a contour line whose slope is  $-\frac{c_1}{c_2}$ . Sensitivity analysis in two dimensions therefore reduces to determining the range of slopes for which the contour line still supports the feasible region at the current optimal vertex. The allowable range is the interval of slopes for which no adjacent vertex yields a better objective value, ensuring that the supporting line touches the feasible region only at the optimal point.