IEDA 5230 (Fall 2023)

Assignment 1

Due date: Sept 27, 2023

This assignment refers to Lecture Notes 3

1. Slide 7. Sensitivity analysis of Product 2 gives “Allowable Increase = 16.82” and “Allowable Decrease = 1.16.”
   1. Show how the above two values are calculated.
   2. Explain how the optimal solution may (or may not) change when the parameter 25.00 changes within/beyond the range.
2. Slide 11. Sensitivity analysis of M2 gives “Allowable Increase = 30.36” and “Allowable Decrease = 15.31.”
   1. Show how the above two values are calculated.
   2. Explain how the optimal solution may (or may not) change when the parameter 200.00 changes within/beyond the range.
3. Slide 10. Consider the LP in standard from.
   1. Write the dual of the LP.
   2. Use this pair of primal/dual to demonstrate the proof of strong duality in slide 27.

1.

a.

When increases to , reduced cost

b.

the optimal solution may **not** change when the parameter 25.00 changes within the range.

Outside of this range, the solution will change, to lower the value of the basic variable for reductions and increase its value of increases in its objective function coefficient.

2.

a.

b.

Changes in the right-hand side of binding constraints always change the solution (the value of x must adjust to the new constraints).

The shadow price associated with a particular constraint is the change in the optimal value of the objective function per unit increase in the righthand-side value for that constraint, all other problem data remaining unchanged.

3.

a.

Dual of the LP:

Minimize

Subject to

b.

For primal, an optimal solution is

Reduced cost for non-basic variables:

Let , we have

* is feasible to the dual
* is optimal to the dual