Economic interpretation (motivation) of the Dual

Product mix example – 2 products

X1 = number of units of product 1

X2 = number of units of product 2

(Primal)

Max profit = 100X1 + 200X2

Constraints

2X1 + 3X2 <= 1000 (Units of resource 1 available)

4X1 + 5X2 <= 2000 (Units of resource 2 available)

6X1 + 7X2 <= 3000 (Units of resource 3 available)

X1, X2 >= 0

Suppose a buyer is interested in purchasing resources. For amount, etc. Can we make money selling our resources?

What restrictions should we put on , etc?

,, >= 0 (non-negativity)

If we forego the production of 1 unit of x1, we lose $100 profit, but release 2 units of resource 1, 4 units of resource 2, and 6 units of resource 3.

We are looking at the problem by columns

How much should the buyer pay?

They will pay fair-market - break even prices – shadow prices, reduced costs)

(dual)

Constraints:

,, >= 0 (non-negativity)