Sensitivity

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Definition & Problem Example

- Does a change in coefficient effect the **value** of the Objective Function? (as opposed to the **basis**)

- Tweaking coefficients for possible differences in data

Approaches

- Brute Force
- Classical Sensitivity Analysis
- **Computer Based Ranging**

Objective Function
(Reduced Cost)

RANGES IN WHICH THE BASIS IS UNCHANGED:

```
LP OPTIMUM FOUND AT STEP        2

        OBJECTIVE FUNCTION VALUE
    1)      50.000000

VARIABLE        VALUE           REDUCED COST
    X1          2.000000            .000000
    X2          2.000000            .000000

    ROW     SLACK OR SURPLUS    DUAL PRICES
    2)          .000000          5.000000
    3)         1.000000           .000000
    4)          .000000         10.000000
```

		OBJ COEFFICIENT RANGES	
VARIABLE	CURRENT COEF	ALLOWABLE INCREASE	ALLOWABLE DECREASE
X1	15.000000	INFINITY	5.000000
X2	10.000000	5.000000	10.000000

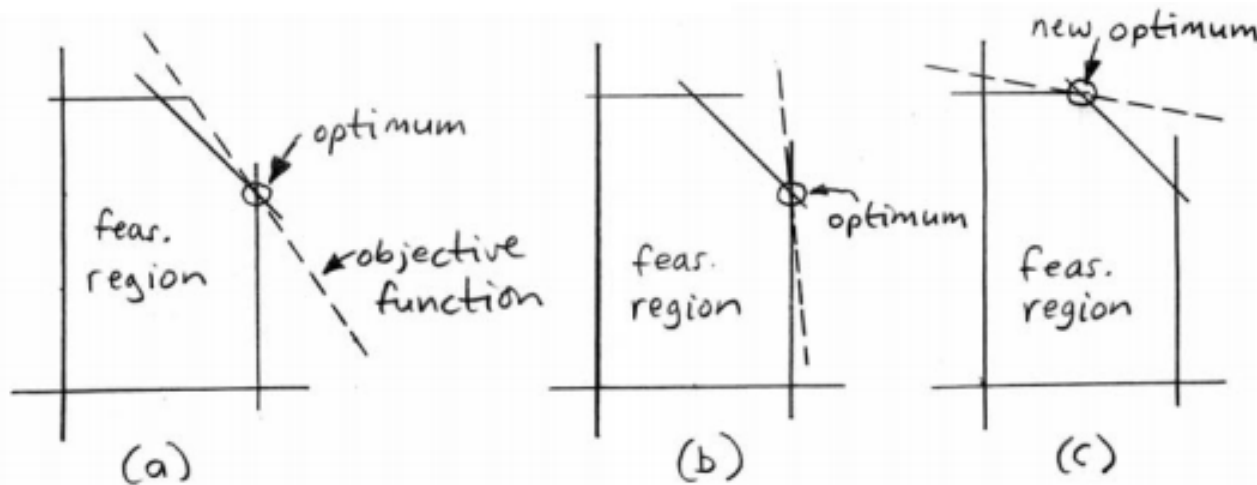|		RIGHTHAND SIDE RANGES	
ROW	CURRENT RHS	ALLOWABLE INCREASE	ALLOWABLE DECREASE
2	2.000000	2.000000	1.000000
3	3.000000	INFINITY	1.000000
4	4.000000	1.000000	2.000000

Figure 6.2: Changing a coefficient in the objective function tilts it. (a) original objective function. (b) a tilt which does not change the optimum basis. (c) a tilt which changes the optimum basis.

Right Hand Side
(Dual Price or Shadow Price)

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LP OPTIMUM FOUND AT STEP        2

        OBJECTIVE FUNCTION VALUE
    1)       50.000000

VARIABLE         VALUE           REDUCED COST
    X1         2.000000              .000000
    X2         2.000000              .000000

    ROW    SLACK OR SURPLUS      DUAL PRICES
    2)          .000000            5.000000
    3)         1.000000             .000000
    4)          .000000           10.000000
```

```
                              OBJ COEFFICIENT RANGES
VARIABLE          CURRENT        ALLOWABLE        ALLOWABLE
                  COEF           INCREASE         DECREASE
   X1          15.000000         INFINITY         5.000000
   X2          10.000000         5.000000        10.000000

                           RIGHTHAND SIDE RANGES
   ROW            CURRENT        ALLOWABLE        ALLOWABLE
                  RHS            INCREASE         DECREASE
    2            2.000000        2.000000         1.000000
    3            3.000000        INFINITY         1.000000
    4            4.000000        1.000000         2.000000
```
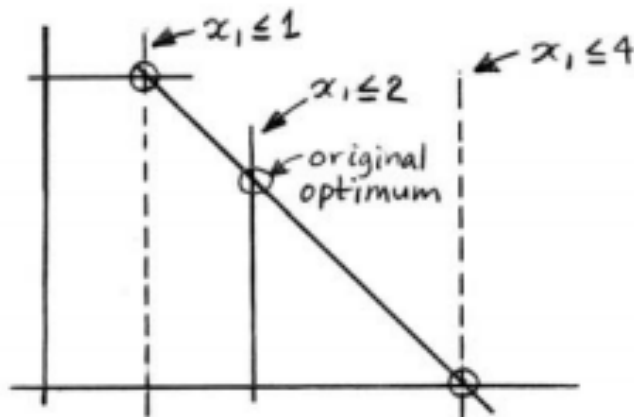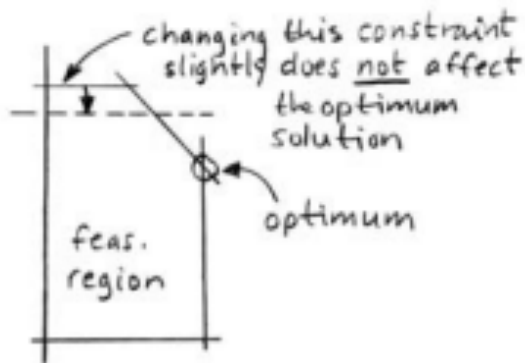

Figure 6.3: Changing a right hand side may not affect the optimum at all.

Figure 6.4: Why the basis changes outside the range.