

AGEC 641 Final Exam

1. Model the crop selection part of the following situation in general:

A farmer has five 130-acre irrigation circles. On these circles one of four crops may be grown. The farmer is limited by resources due to water management concerns, the farmer wishes only one crop to be grown on each circle (i.e., corn only on circle #1).

2. Given the transportation problem:

$$\begin{aligned} \min \quad & \sum_i \sum_j c_{ij} x_{ij} \\ & \sum_j x_{ij} \leq s_i \\ & -\sum_i x_{ij} \leq -D_j \\ & x_{ij} \geq 0 \end{aligned}$$

- a. What is the nature of the demand and supply curves in the model for supplies and demand of the product.
- b. Modify the model so it includes linear downward sloping demand curves at each demand point, as well as upward sloping supply curves for that supplied at each supply point.
3. Suppose you had the transportation model as modeled above. How could you validate it for use in analysis?
4. Discuss how you would find the marginal change in the objective function for a change in the right-hand side under quadratic and integer programming. Also tell how these differ from solver and LP shadow prices.
5. Address the truth of the following:

Because linear programming assumes a deterministic process that exhibits constant returns to scale and fixed proportionality of inputs, it's usefulness in economic analysis is limited.

6. Suppose you had the following problem.

$$\begin{array}{rcllcl}
 \text{Max} & -3x_1 & + & ax_2 & & \\
 & -x_1 & + & x_2 & \leq & 0 \\
 & & & bx_2 & \leq & c \\
 & x_1 & , & x_2 & \geq & 0
 \end{array}$$

where you are certain of the coefficients of x_1 but do not know a , b , and c with certainty.

Suppose we establish this model under the condition that today we must choose the amount of x_1 to undertake; later we receive information on the parameters of a , b , and c where the following possible outcomes can exist.

Outcome	Probability	a	b	c
1	.25	5	1.0	30
2	.30	2	1.2	35
3	.45	4	1.1	30

and then you can chose the x_2 level.

Formulate this model including risk aversion.

7. Using a risk programming EV model as an example to tell how you might deal with establishing a decision-makers characteristics in terms of the trade-off between multiple goals.