

Deterministic Math Models (550.251)

Quiz 1

Name Solutions

A farmer has 10 acres to plant in wheat and rye. He has to plant at least 7 acres. However, he has only \$1200 to spend and each acre of wheat costs \$200 to plant and each acre of rye costs \$100 to plant. Moreover, the farmer has to get the planting done in 12 hours and it takes an hour to plant an acre of wheat and 2 hours to plant an acre of rye. If the profit is \$500 per acre of wheat and \$300 per acre of rye formulate a linear program that answers how many acres of each should be planted to maximize profits.

Let $W = \#$ acres wheat planted

$R = \#$ acres rye planted

$$\max 500W + 300R \quad (\text{profits in } \$)$$

$$\text{s.t.} \quad W + R \leq 10 \quad (\text{avail acres})$$

$$W + R \geq 7 \quad (\text{min acres planted})$$

$$200W + 100R \leq 1200 \quad (\text{budget})$$

$$W + 2R \leq 12 \quad (\text{avail hours})$$

$$W, R \geq 0 \quad (\text{nonneg})$$

(remember profit = revenue - costs)