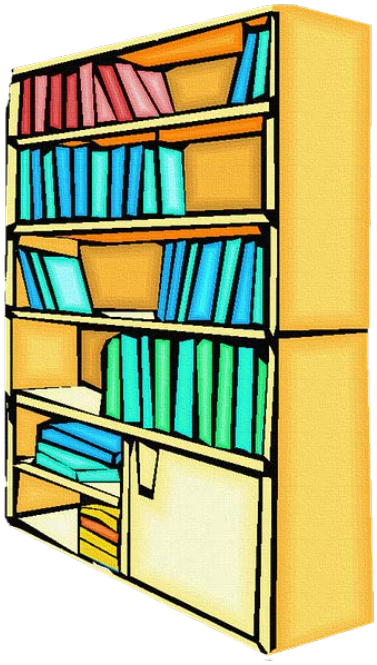
2017-12-28

A New Library

MTH-5150-2 General Optimization



Learning Situation

Adult Learners' Workbook

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Background

Optimist International is a worldwide volunteer organization that has been active for several decades. The organization comprises more than 2,500 affiliated Optimist clubs whose mission is to bring out the best in youth, in their communities and in themselves.

As members of their local Optimist club, Marie and Luke's mission is to update their municipal library's youth section. They estimate a budget of $2,000 will be sufficient. They have decided to hold a benefit dinner to raise the needed money.

In this learning situation, you will be asked to solve three problems: optimize profit from the benefit dinner, find the critical path to plan the project timetable, and optimize the cost of purchasing a small gift to give to the children attending the dinner.

Task 1

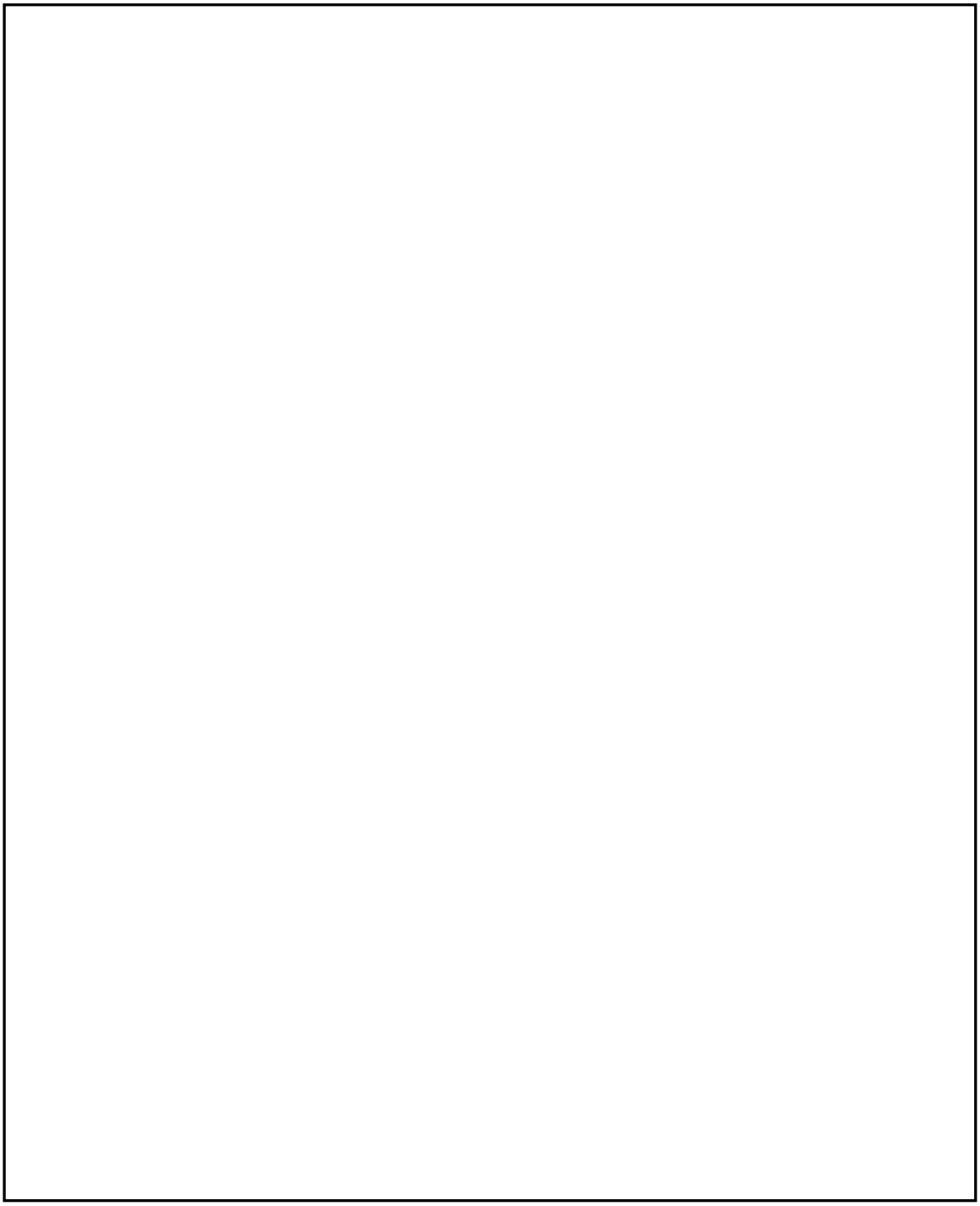
Before they determine the date of the fundraising dinner, Marie and Luke must discuss the project development with all of the volunteers. They have to produce

specifications so they can plan the dinner. The specifications will enable planning of all of the preliminary steps and production of a timetable.

Here is the task summary table that Luke designed. Each task can be done in a day—except for tasks F, G and H, which will take 10, 35 and 7 days, respectively.

Tasks	Prerequisite tasks
A: Meet with caterer	None
B: Reserve a tent	None
C: Meet to determine the number and price of tickets according to the desired profit level	A-B
D: Design and print tickets	C
E: Design and print advertising posters	C
F: Order and deliver attendee gifts	C
G: Sell tickets	C-D
H: Distribute advertising posters	E
I: Hold a meeting to plan the events to be held on the day of dinner	F-G-H
J: Prepare the site before the dinner	I

Based on this information, devise a timetable to optimize the situation.



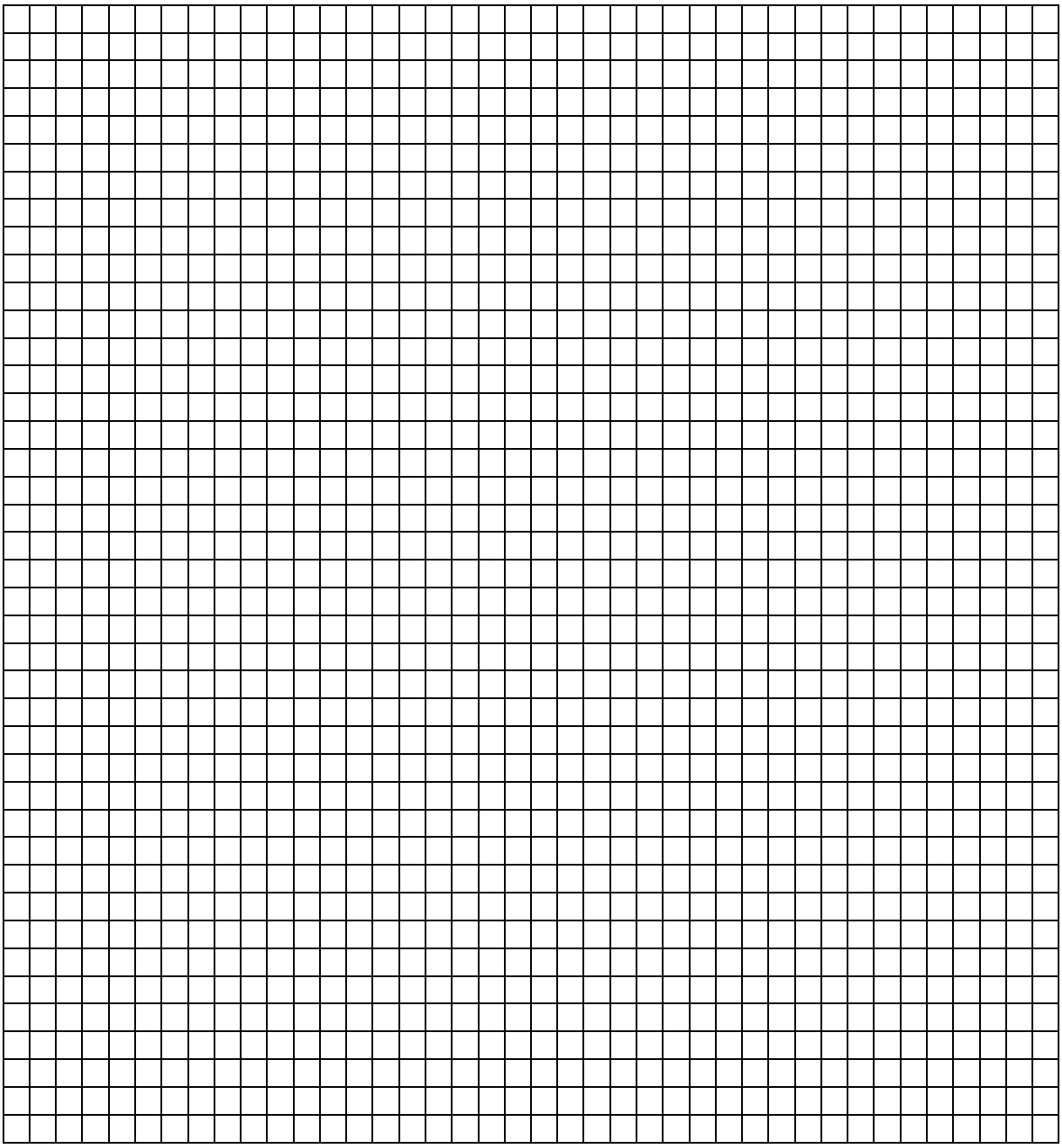
Task 2

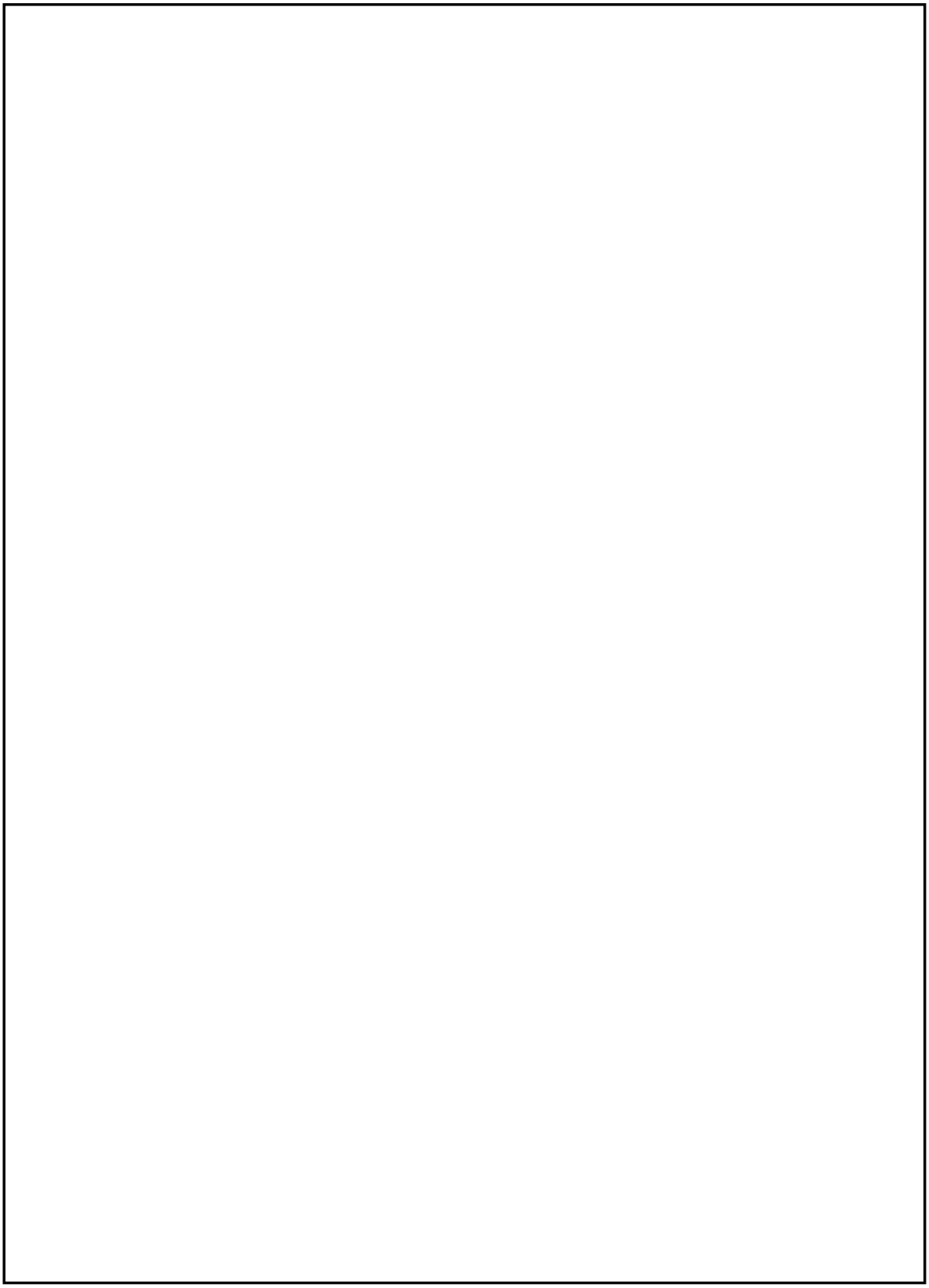
For the dinner, Marie and Luke will be using a caterer who will prepare a complete meal. They will have to spend $14.50 for each adult meal. The caterer has decided to provide children's meals at no charge.

As the event is being held during the summer, it will be taking pace outside. Tables will be set up in a park and a tent that is being rented for $380, including taxes, will be used for a VIP section. They will thus have 75 free places reserved for children, plus 110 regular places and 40 VIP places to be sold to adults. As the goal is to raise a minimum of $2,000 for the municipal library, the organizers must sell these places at a profit. Any profits in excess of $2,000 will be used to purchase attendee gifts.

To ensure that all tickets are sold, the organizers of previous years' benefit dinners suggested that Marie and Luke keep the cost of tickets within a certain range. Thus, the regular ticket cost should not be more than $25, and the cost of a VIP ticket should not be more than $60. The minimum price of both types of tickets should be $15. Also, the price of a VIP ticket must be at least double the cost of a regular ticket.

What ticket prices should they set to optimize profits?



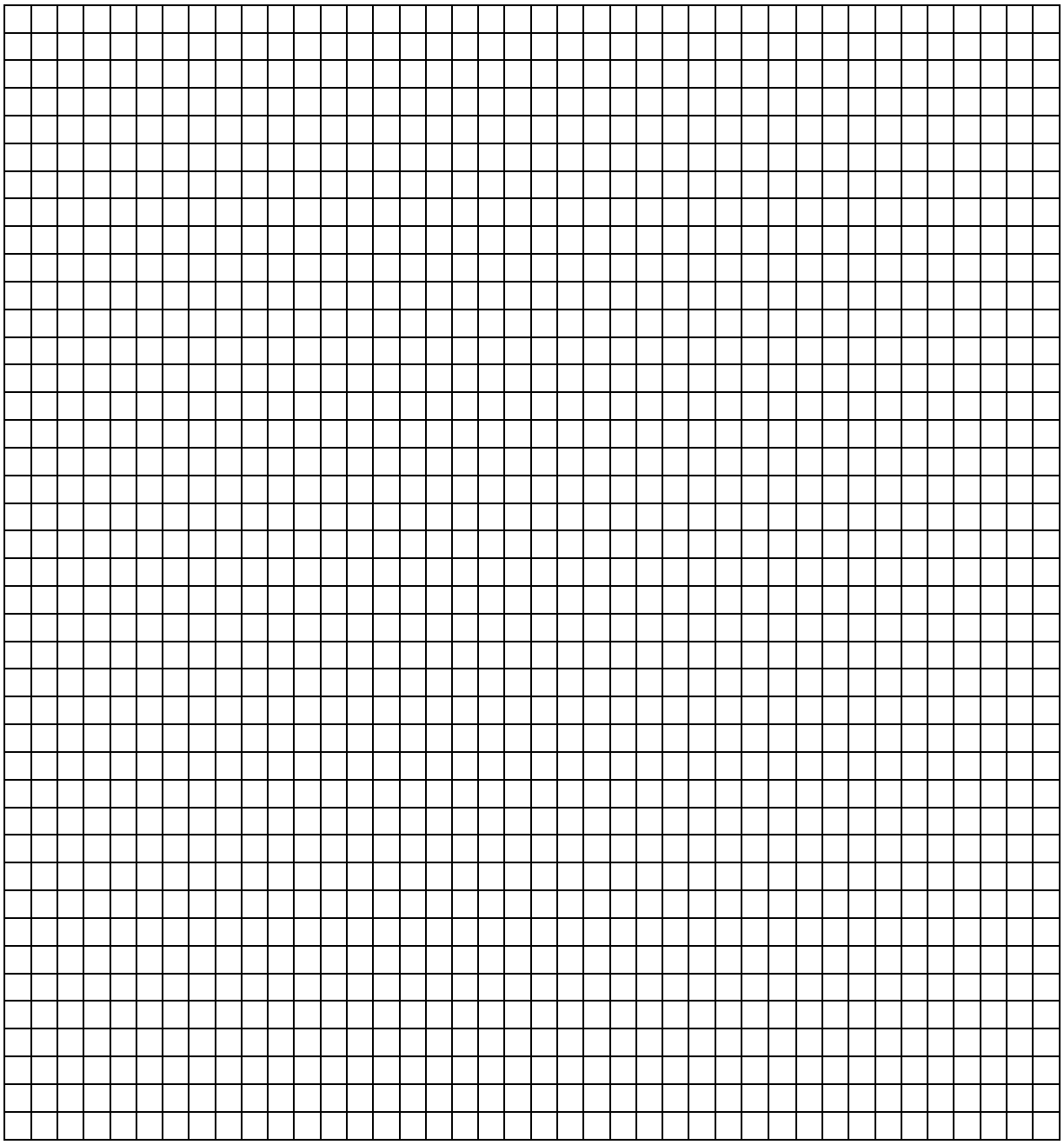


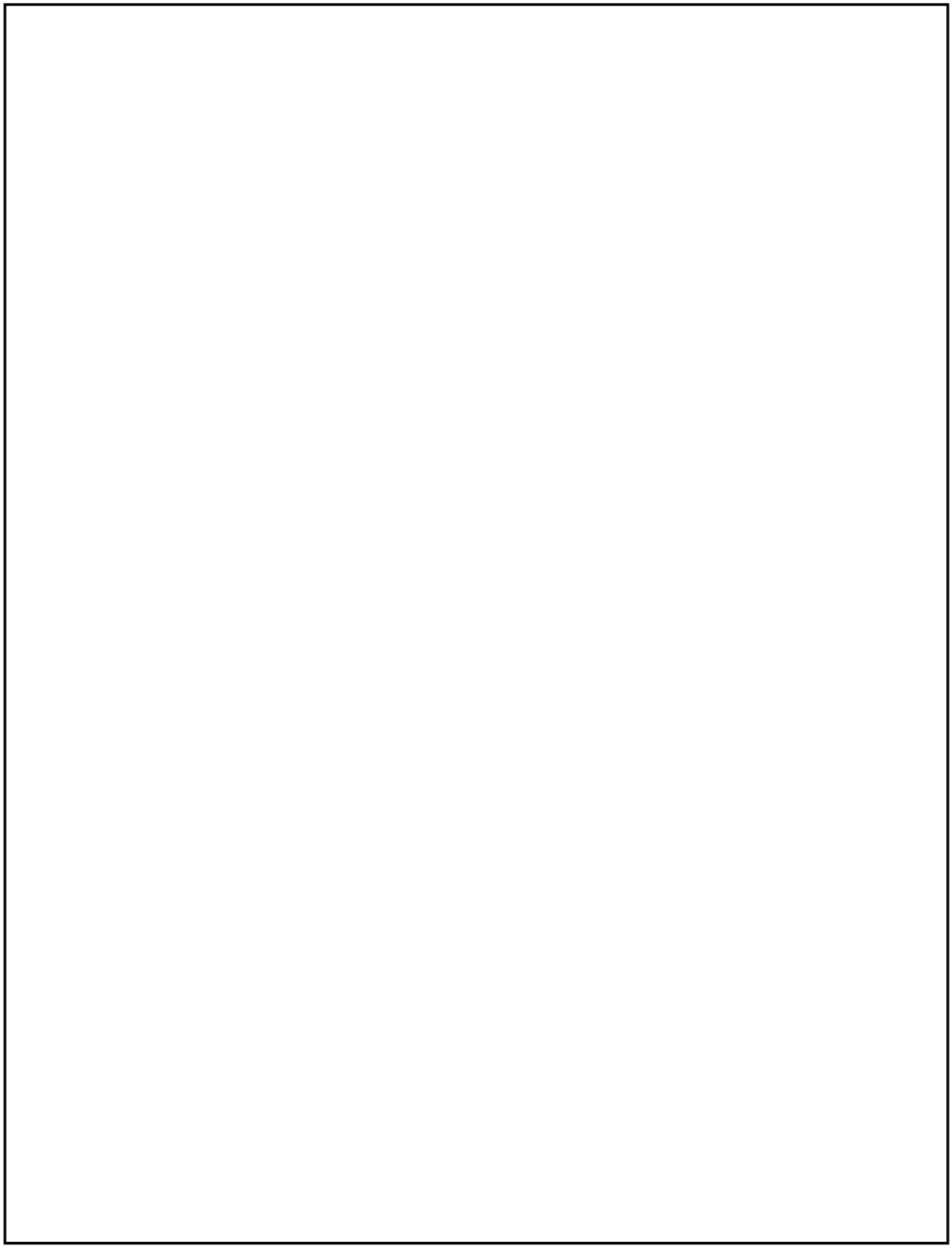
Task 3

Marie will be using surplus profit from ticket sales to purchase attendee gifts. As the vocation of an Optimist Club is to support children, Marie would like to give them higher-value gifts.

Looking at a catalogue from a distributor of promotional items, Marie has determined the cost of an adult gift should be least $0.50 and no more than $5 for a child's gift. She would also like the cost of an adult gift to be no more than one third the cost of a child's gift.

Will Marie have enough money to buy gifts if there are 150 adults and a maximum of 75 children at the dinner?





Reflection

A) What would be the possible effects of increasing the number of available places? Explain using examples and calculations.

B) Would it be possible to reach all of the objectives without choosing the vertices that optimize each of the situations? What would be the possible impacts? Explain using examples and/or calculations. How would this benefit the organizers?