



CENGAGE
Learning

An Introduction to Management Science

Quantitative Approaches
to Decision Making

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THIRD EDITION

SOLUTIONS MANUAL

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Quantitative Approaches to Decision Making 3e
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Note

This Solutions Manual contains solutions to those end-of-chapter problems not contained in the Appendix D answer section in the printed book.

Chapter 1: Introduction

1-1 The key stages are:

- Problem recognition
- Problem structuring and definition
- Modelling and analysis
- Solution and recommendation
- Implementation

1-3 A quantitative approach should be considered because the problem is large, complex, important, new and repetitive.

1-5 Model (a) may be quicker to formulate, easier to solve, and/or more easily understood.

1.7

a) $x + y$

b) $0.2x + 0.25y$ c)

$$0.55x + 0.50y$$

d) $x + y \leq 5000$

e) $x \leq 4000$
 $y \leq 3000$

f) Maximize $0.55x + 0.50y$

Subject to

$$x + y \leq 5000$$

$$x \leq 4000$$

$$y \leq 3000$$

1-9

a. $TC = 1000 + 30x$

b. $P = 40x - (1000 + 30x) = 10x - 1000$

c. Breakeven when $P = 0$
Thus $10x - 1000 = 0$
 $10x = 1000$
 $x = 100$

1-11

a. Profit = Revenue - Cost
 $= 20x - (80,000 + 3x)$
 $= 17x - 80,000$

Break-even point

$$\begin{aligned}17x - 80,000 &= 0 \\17x &= 80,000 \\x &= 4706\end{aligned}$$

b. Loss with Profit = $17(4000) - 80,000 = -12,000$

c. Profit = $px - (80,000 + 3x)$
 $= 4000p - (80,000 + 3(4000)) = 0$
 $4000p = 92,000$
 $p = 23$

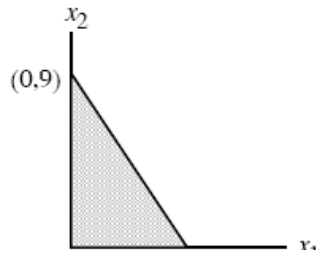
d. Profit = $€25.95(4000) - (80,000 + 3(4000))$
 $= €11,800$

Probably go ahead with the project although the €11,800 is only a 12.8% return on the total cost of €92,000.

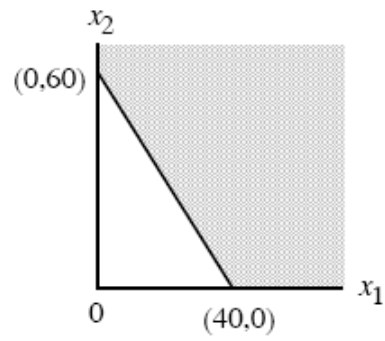
Chapter 2: An Introduction to Linear Programming

2-3.

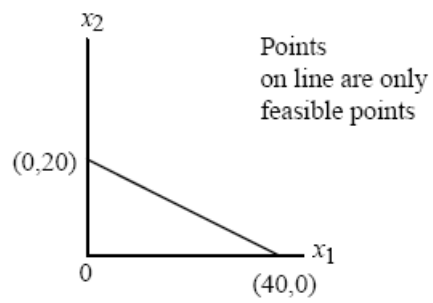
a.



b.

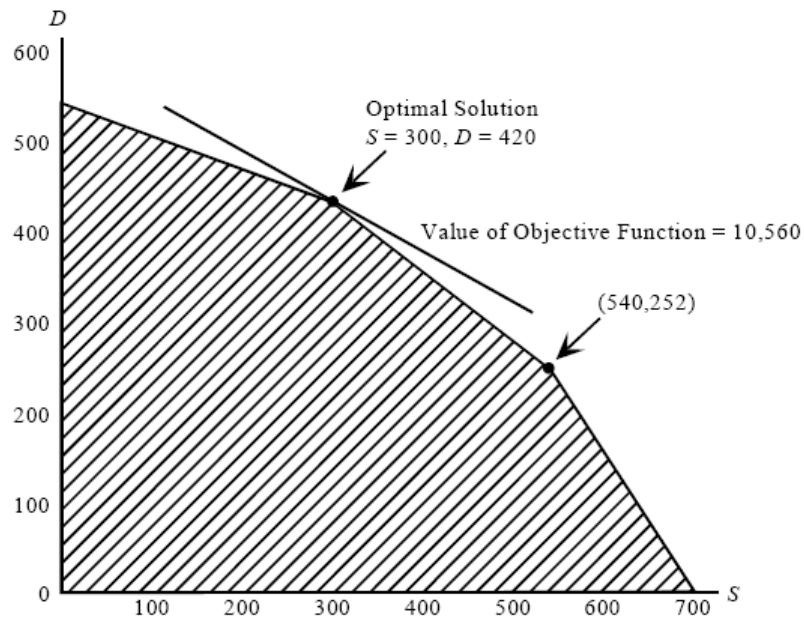


c.



2-10

a.



b. Similar to part (a): the same feasible region with a different objective function. The optimal solution occurs at $(708, 0)$ with a profit of $20(708) + 9(0) = 14,160$.

c. Similar to part (a): the same feasible region with a different objective function. The optimal solution occurs at $(708, 0)$ with a profit of $20(708) + 9(0) = 14,160$.

2-14

a.

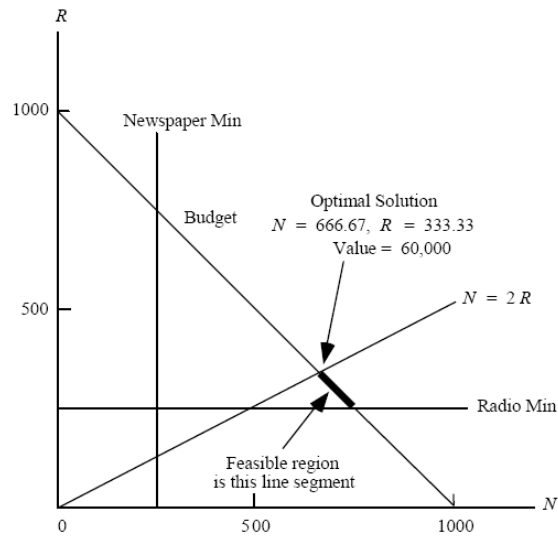
Let N = amount spent on newspaper advertising
 R = amount spent on radio advertising

$$\text{Max } 50N + 80R$$

s.t.

$$\begin{array}{llll} N + R & = & 1000 & \text{Budget} \\ N & \geq & 250 & \text{Newspaper min.} \\ R & \geq & 250 & \text{Radio min.} \\ N & \geq & 2R & \text{News} \geq 2 \text{ Radio} \\ N, R & \geq & 0 & \end{array}$$

b.



19. Max $160M_1 = 345M_2$

s:t:

$$\begin{array}{rcll} M_1 & & \leq & 15 \\ & M_2 & \leq & 10 \\ M_1 & & \leq & 5 \\ & M_2 & \leq & 5 \\ 40M_1 + 50M_2 & \leq & & 1000 \\ M_1; M_2 & \leq & & 0 \end{array}$$

b. $M_1 = 12.5, M_2 = 10$