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

$17x - 80{,}000 = 0$

$17x = 80{,}000$

$x = 4706$

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