

CHAPTER 1

Solutions to Chapter-End Problems

A. Key Concepts

When to Use Engineering Economics:

- 1.1
- (a) Yes - several quantifiable alternatives exist
 - (b) Yes - if quantifiable
 - (c) No - alternatives are not quantifiable
 - (d) No - since it mainly involves intangible qualifications of the candidate
 - (e) Yes - at least two alternatives are quantifiable
 - (f) Yes - with quantifiable costs and benefits
 - (g) No - hard to quantify
 - (h) Yes - if the effect is quantifiable
 - (i) Yes - quantifiable
 - (j) No - benefits are hard to quantify
 - (k) Yes - quantifiable
 - (l) Yes - if quantifiable

1.2 Five examples:

- 1) Location of the business: renting vs. buying decision
- 2) Equipment: leasing vs. buying decision
- 3) Equipment: choosing one out of several alternatives; analysis of cost savings
- 4) Viability of the business: analysis of cash flow; ability to recover the capital investment
- 5) Effect of the corporate tax rate

1.3 Whatever the description for the items listed, it should be clear that all engineering design is founded on controlling the costs incurred.

Ethics in Decision-Making:

1.4 There is no right or wrong answer to any of these questions. The student should observe, however, that there often is a difference in how we *should* behave compared to how we *do* behave.

B. Applications

- 1.5** There is no right answer to which they should move into. However, they probably will move into the duplex, on the grounds that emotion has a more direct impact on our decisions than does logic.
- 1.6** **(a)** She should probably not buy the cheapest one. She cannot decide on price alone.
- (b)** If everything else is the same, one would expect Karen to buy the cheapest one.
- 1.7** Ciel can (1) invest time in making sure she has the best information about all of the issues that will affect her future sales, and (2) do sensitivity analysis in her financial calculations.
- 1.8** It is not clear that Trevor should sell out to Venture Corp. He will get more money that way, but it may be very important to him that his brainchild continue to thrive. What Trevor has to decide is whether avoiding the displeasure he gets from Venture Corp. closing down his company is worth \$1 000 000 to him. If it is, he should take the Investco offer, or if not, the Venture Corp. offer.
- 1.9** Possible uncertainties that associate with the new technology:
- 1) Is the new technology proven to be viable?
 - 2) Is the performance or quality that are expected from the technology proven to be consistent?
 - 3) Are there any “side effects”?
 - 4) Is this technology going to stay, or will it be replaced quickly by an alternative technology?
 - 5) What market share might Telekom gain?

Sensitivity analysis may be able to address the second and third issues by considering a range of performance/quality/side effect issues. The first and fourth issues, however, may be difficult to address by sensitivity analysis since there is no specific quantity that can be varied.

C. More Challenging Problems:

- 1.10** The Toyota Corolla is the right choice when the interest rate is very high, while the BMW is the right choice if the interest rate is very low.

Notes for Case-in-Point 1.1

- 1) There is no acceptable death rate, but engineering projects proceed even when it is known that deaths will occur.
- 2) No right answer. This is a matter of judgement. However, deaths by accident or otherwise will occur whether or not a particular project is approved.
- 3) No right answer. It depends on the circumstances.

Notes for Mini-Case 1.1

- 1) The student should observe that the offending companies usually have a good reason for staying in business, such as supplying employment, supplying a necessary good, or that efforts to clean up are taking time but should eventually be done.
- 2) No right answer. Fining a company affects the shareholders, who are the real owners of the company. On the other hand, fining the management may be appropriate in large companies where the shareholder are often unaware of the effects of decisions of management.
- 3) Perhaps, so there is less pollution. Perhaps not, because companies may be forced to close or move to another country, or goods may become too expensive. Some level of pollution is probably acceptable.
- 4) Some companies do the socially correct thing anyhow, either for profits resulting from having a “green” image, or because of the moral values of management or owners.