MATH1003

ASSIGNMENT 10

Suggested practice questions (the answers are in the back of the textbook):

- *§4.7; 7, 9, 13, 17, 19, 31, 33, 43, 63.*

1. Find the dimensions of a rectangle with area $1000m^2$ whose perimeter is as small as possible.

2. A closed rectangular box with square base and a volume of $12\,\mathrm{m}^3$ is to be constructed using two different types of materials. The top is made of a metal costing \$2 per m^2 and the remainder of wood costing \$1 per m^2. Find the dimension of the box for which the cost of materials is minimised.

3. An new fitness club, Bath Spa, will be opening soon. The owner intends to offer memberships at the rate of \$200, provided that a minimum of one–hundred people join. For each member in excess of one–hundred the membership fee will be reduced by \$1 per person (for all members). At most 160 memberships can be sold. How many memberships should the owner of Bath Spa try to sell in order to maximise the revenue?

4. A small-scale Fredericton manufacturer of snow shovels cannot produce more than eight shovels per day. The cost and revenue functions are given by:

$$C(x) = 2x^3 + x^2 - 100x + 200,$$
$$R(x) = x^2 + 50x,$$

where x denotes the number of shovels produced per day. How many shovels should be produced daily in order to maximise profit?

5. A manufacturer of bicycles in Oxford finds that when x bicycles are produced, the following costs are incurred: a fixed cost of $£1,000$, labour cost of $£10$ per bicycle, and a cost of:

$$£\frac{25,000}{x}$$

for advertising. How many bicycles should be produced in order to minimise the total cost?

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http://erdos.math.unb.ca/∼kasprzyk/
kasprzyk@unb.ca.