1. Both the Barings’ fall and Daiwa’s huge loss involve rouge traders (Nicholas Leeson and Toshihide Iguchi, respectively). Search the relevant web sites to obtain the basic facts about these two cases of poor risk management. Comment on the similarities and differences in these two cases in terms of (i) lack of controls within the institutions, (ii) how the market events triggered these huge losses.

2. Suppose that each of two investments has a 0.9% chance of a loss of $10 million, a 99.1% of a loss of $1, and 0% chance of a profit. The investments are independent of each other.

   (a) What is the VaR for one of the investments when the confidence level is 99%?
   (b) What is the expected shortfall for one of the investments when the confidence level is 99%?
   (c) What is the VaR for a portfolio consisting of the two investments when the confidence level is 99%?
   (d) What is the expected shortfall for a portfolio consisting of the two investments when the confidence level is 99%?
   (e) Show that in this example VaR does not satisfy the subadditivity condition whereas expected shortfall does.
   (f) What is the difference between expected shortfall and VaR? What is the theoretical advantage of expected shortfall over VaR?

3. Suppose that the change in the value of a portfolio over a one-day time period is normal with a mean of zero and a standard deviation of $2 million. What is (a) the one-day 97.5% VaR, (b) the five-day 97.5% VaR, and (c) the five-day 99% VaR?

4. (a) What is the difference between economic capital and regulatory capital?
   (b) In what respects are the models used to calculate economic capital for market risk, credit risk, and operational risk likely to be different from those used to calculate regulatory capital?

5. Suppose that the credit loss in a year has a lognormal distribution. The logarithm of the loss is normal with mean 0.5 and standard deviation 4. What is the economic capital requirement if a confidence level of 99.97% is used?

6. Suppose that daily gains and losses are normally distributed with standard deviation of $5 million.

   (a) Estimate the minimum regulatory capital the bank is required to hold (assume a multiplicative factor of 4.0).
   (b) Estimate the economic capital using a one-year time horizon and a 99.9% confidence limit, assuming that there is a correlation of 0.05 between gains or losses on successive days.
7. Suppose that the economic capital estimate for two business units are as follows:

<table>
<thead>
<tr>
<th>Type of risk</th>
<th>Business Unit 1</th>
<th>Business Unit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market risk</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Credit risk</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Operational risk</td>
<td>50</td>
<td>10</td>
</tr>
</tbody>
</table>

The correlation between market risk and credit risk in the same business unit is 0.3. The correlation between credit risk in one business unit and credit risk in the other is 0.7. The correlation between market risk in one business unit and market risk in the other is 0.2. All other correlations are zero. Calculate the total economic capital. How much should be allocated to each business unit?

8. A bank is considering expanding its asset management operations. The main risk is operational risk. It estimates the expected operational risk loss from the new venture in one year to be $2 million and the 99.9% worst-case loss (arising from a large investor law suit) to be $40 million. The expected fees it will receive from investors for the funds under administration are $12 million per year and administrative costs are expected to be $5 million per year. Estimate the before-tax RAROC.