Faculty of Actuarial Science and Statistics
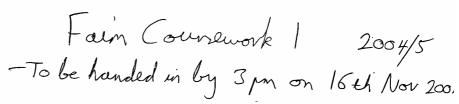
Undergraduate Coursework Submission Form

Complete the details below, attach the form to your coursework and **POST it in the Actuarial Coursework Box** no later than **3pm** on the due date on the Second Floor of the Parkes Building. All late coursework MUST be posted in the same box, not handed to your Lecturer/Tutor.

Student to complete

Name ....

Degree Course _BSc ACTUARIAL SCIENCE_ Year _I_

Subject Title .FAIM. ....

Lecturer/Tutor Name ...Mr B. RICKAYZEN..

Set Date ....20/10/03........................ Submission Deadline...... 16/11/04

I confirm that the work is my own, that I have not copied the work of others, and that I have referenced the work of other authors in an appropriate way.

Signed ....

If you are unable to finish the coursework by the submission deadline you should see your lecturer, or tutor, taking any medical certificates with you, to obtain authorisation to submit your work after the deadline.

Lecturer/Tutor to complete **Authorised Late Submission** Revised submission Date: Reason: Authorised by:	**Date Submitted**

Lecturer/Tutor to complete

Final Mark

If penalties were applied:

Raw Mark:

Marks Deducted:

Reason for Deduction:

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Name ....

Subject title ....

Date of Submission ....

Faculty Stamp

Please retain this as a receipt of submission

QUESTION 1

Find the amount to which £100 will accumulate as follows:

(i)   At 4% p.a. convertible quarterly for 10 years.

(ii)   At 6% p.a. convertible half-yearly for 5 years.

(iii)   At the rate of interest corresponding to an effective rate of discount of 3% p.a. for 8 years.

(iv)   At a force of interest of 4% p.a. for 3 ¾ years.

(v)   At 5% p.a. effective for 10 years, 4% p.a. effective for 5 years and 2 ½ % p.a. effective for 3 years.

(vi)   At a force of interest of 4% p.a. for 3 ¾ years followed by an effective interest rate of 4% p.a. convertible quarterly for 10 years.

[12 Marks]

QUESTION 2

Calculate the effective annual rates of interest implied by the following:

(a)   A rate of discount per quarter of 2%.

(b)   A force of interest of 4% per annum.

[4 Marks]

QUESTION 3

The force of interest $\delta(t)$ at time t (measured in years) is given by:

$$\delta(t) = 0.05 \qquad \text{for } 0 < t \leq 8$$
$$\delta(t) = 0.01 + 0.005t \qquad \text{for } 8 < t \leq 12.$$

(a)   Calculate the corresponding effective annual rate of interest for the period t=9 to t=10.

(b)   Calculate the accumulated value at time t=12 of £100 invested at time t=2.

(c)   Calculate the accumulated value at time t=10 of a continuous payment stream paid at the constant rate of 1 per annum from time t=0 to time t=5.

[10 Marks]

Question 4

The force of interest $\delta(t) = a + bt$ for $t > 0$, where a and b are constants. The accumulation of £1,000 for 5 years is £1,300 and the accumulation of £1,000 for 8 years is £1,500.

(i)   Find a and b.

(ii) Find the accumulation of £100 between time 5 and time 8.   [8 Marks]

QUESTION 5

(i)   Calculate the present value of £100 due in 5 years time at:

   (a)   A simple rate of discount of 6% per annum.

   (b)   A compound rate of discount of 6% per annum paid monthly.

(ii) Find the constant equivalent force of interest implied by each of the transactions in (a) and (b) above.

   [6 Marks]

QUESTION 6

The force of interest $\delta(t) = 0.06$ for all values of t. A continuous payment stream is paid to an investor for a period of five years. Find the present value of the payment stream if the rate of payment is:

(i)   £500 per annum $0 < t \leq 5$

(ii) £500 $e^{0.03t}$ per annum $0 < t \leq 5$

   [6 Marks]