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 _Actuarial Science_ .... Year _I_ ....

Subject Title _Financial & Investment Maths: Cswk 3_

Lecturer/Tutor Name _Mr B. Rickayzen_

Set Date _16th Feb 2005_ Submission Deadline _Fri 4th March 2005_

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)

An ordinary share pays annual dividends. The next dividend is expected to be 12p per share and is due in exactly 8 months time. It is expected that subsequent dividends will grow at a rate of 4% per annum compound and that inflation will be 3% per annum. The price of the share is 220p and dividends are expected to continue in perpetuity.

Calculate the expected effective real rate of return per annum for an investor who purchases the share.

[Total 8 marks]

Question 2)

A property development company has just purchased an office block for £2,400,000. A further £310,000 will be spent on refurbishing the block in 6 months time.

An agreement has been made with a tenant who will occupy the office block exactly one year after the date of purchase of the office block. The tenant will pay rent to the company for six years and will then immediately purchase the building from the company for £3,800,000.

The first year's rent has been set at £240,000 per annum payable monthly in advance. The agreement states that, at the start of each subsequent year, the annual rent will increase by a fixed percentage on a compound basis.

Assuming that rental income is always received monthly in advance, calculate (to one decimal place) the compound percentage increase in the annual rent required to earn the company a rate of return of 12% per annum on the property.

[Total 14 marks]

Question 3)

A loan of nominal amount £1,000,000 is to be issued bearing a coupon of 6% per annum payable half yearly in arrears.

The loan is to be repaid at the end of twenty years at 105% of the nominal value.

An institution not subject to either income or capital gains tax bought the whole issue at a price to yield 7% per annum effective.

(i)   Calculate the price per £100 nominal which the institution paid.

[4 marks]

(ii)   Exactly five years later, immediately after the coupon payment, the institution sold the entire issue of stock to an investor who pays both income and capital gains tax at a rate of 25%. Calculate the price per £100 nominal which the investor pays the institution to earn a net redemption yield of 6% per annum effective.

[8 marks]

[Total 12 marks]

Question 4)

A loan of nominal amount £100,000 is to be issued bearing coupons payable quarterly in arrears at a rate of 7% p.a. Capital is to be redeemed at 108 on a coupon date between 15 and 20 years after the date of issue, inclusive; the date of redemption is at the option of the borrower.

An investor who is liable to income tax at 25% and capital gains tax at 35% wishes to purchase the entire loan at the date of issue. Calculate the price which the investor should pay to ensure a net effective yield of at least 5% p.a.

[Total 12 marks]

QUESTION 5)

A loan is repayable by decreasing annual instalments made in arrears for 15 years. The payment made at the end of the first year is £2,000 and subsequent payments decrease by £100 each year. The instalments were calculated using a rate of interest of 6% per annum effective.

(i)   Calculate the original amount of the loan.   [3 marks]

(ii)   Construct a loan schedule for years eight and nine showing:

    (a)   the capital outstanding at the beginning of each year,

    (b)   the interest which is paid at the end of each year,

    (c)   the capital which is repaid at the end of each year.   [6 marks]

(iii)   Immediately after the ninth payment of interest and capital, the rate of interest on the outstanding loan is increased to 8% per annum effective. It is agreed that at the end of each remaining year of the schedule, the borrower will pay an extra amount of £X in addition to the amount due for that year according to the original schedule, so that the loan will still be fully repaid at the end of the original term.

    (a)   Calculate £X.   [4 marks]

    (b)   Calculate the interest included in the amended final payment.   [3 marks]

    (c)   Calculate the total interest paid during the term of the loan.   [3 marks]

[Total 19 marks]