MAT205 – Exam 1 – Fall 2005

1) (12 points) Mike has to make a payment of $3000 after 8 years. How much should he invest now in order to accumulate the needed money, using:

a) Simple discount of 4% per annum?

b) Compound interest of 4% per annum?

c) Compound discount of 4% per annum?

2) (12 points) a) Given the rate of simple interest of 5%, find d4

b) Given the rate of simple discount of 5%, find i4

c) Show that a constant rate of compound interest i implies a constant effective rate of interest in and that the two are equal

3) (17 points) Kathryn and Jake have a large fund, enough to buy a house. However, they need cash urgently, and they will return it after 1 year. They have three options for borrowing. Perform the necessary calculations for each case, then decide from which bank they should borrow.

a) (4 points) Coop Bank: Charges an interest rate of 7% compounded once every two years

b) (6 points) Silver Bank: Calculates the accumulated value using a force of interest δt = t / 8

c) (4 points) Agriculture Bank: Charges 6.3% payable in advance and convertible semi-annually

d) (3 points) From which lender should they borrow and why?

4) (15 points) A sum of $800 was deposited in a bank at 6% simple interest on November 14, 2001. Find the interest earned by June 10, 2003, assuming:

a) Exact simple interest (actual/actual)

b) Ordinary simple interest (30/360)

c) The Banker’s Rule

5) (8 points) Find the level effective rate of interest over a 9-year period that is equivalent to an effective rate of discount of 7.5% for the first 2 years, 4.5% for years 3, 4, 5 and 6, and 6% for years 7, 8 and 9

6) (8 points) In return for payments of $2000 at the end of 3 years, $4000 at the end of 8 years, and $6000 at the end of 10 years, Mark agrees to pay $3000 immediately and to make an additional payment at the end of 5 years. Find the amount of additional payment if the nominal rate of interest is 8% convertible quarterly.

7) (10 points) A loan is negotiated where the borrower will receive a payment of $2000 immediately, followed by a payment of $4000 at the end of 3 years and a final third payment of $5000 at the end of 6 years.

a) (5 points) Find the amount needed to repay the loan at the end of 10 years, if the nominal rate of interest is 12% compounded monthly

b) (5 points) Find the value of the loan at t= 0 if the nominal rate of discount is 12% compounded monthly

8) (18 points) Payments of $500, $600, and $900 are due at the ends of years 4, 7 and 10 respectively. Assuming an effective rate of interest of 10% per annum, find the point in time at which a single payment of $2000 would be equivalent by using each of the following:

a) The method of equated time

b) An exact method and direct calculation