MAT205 – Exam 1 – 2010

1) (16 points) Answer each of the following questions (The parts are independent).

a) Find the investment needed to accumulate to $5000 at the end of 10 years at a simple discount rate of 6%

b) Find the accumulated value of $1 invested for 1 year if the nominal rate of interest is 12% compounded once every 4 years

c) Find i8 if the rate of compound interest is 10%

d) Show that a constant rate of compound discount d implies that dn is constant

2) (8 points) There effective rate of discount is 4% for the first year, 5% for years 2 and 3, and 6% for years 4, 5, 6 and 7. Find the equivalent rate of simple interest over the seven-year period

3) (7 points) Find the nominal rate of interest convertible semi-annually which is equivalent to a nominal rate of discount of 8% convertible quarterly.

4) (8 points) In return of deposits of $1000 immediately and $2000 at the end of two years, an investor intends to make two equal withdrawals of X each at the end of years four and five. If the nominal rate of interest is 12% convertible monthly, find X.

5) (14 points) A fund accumulates at a force of interest δt = t / 20

 a) (6 points) Find the accumulation function a(t)

 b) (3 points) Find the discount function a-1(t)

 c) (5 points) Find the equivalent annual effective rate of interest over a 5-year period

6) (15 points) A sum of $1000 was deposited in a bank at 9% simple interest on October 26, 2000. It was withdrawn on February 11, 2003. Find the amount of interest earned assuming:

 a) Exact Simple Interest (Actual/Actual)

 b) Ordinary Simple Interest (30/360)

 c) The Bank’s Rule

7) (18 points) Mary makes four deposits into a fund. She deposits $100 at the end of 5 years, $200 at the end of 10 years, $300 at the end of 20 years, and $400 and the end of 40 years.

 a) (6 points) Find the present value of the fund if the effective rate of discount is 5%

b) (12 points) Assuming an effective rate of interest of 5% per annum, find the point in time at which Mary could have made one payment of $1000 instead of four separate payments by using each of the following:

 i) The method of equated time

 ii) An exact method and direct calculation

8) (14 points) At what annual effective rate of interest would an investment of $1000 immediately and $3000 five years from now accumulate to $5000 ten year from now?

 a) (8 points) Using direct calculation

 b) (6 points) Using linear interpolation