FINANCIAL MATHEMATICS
(STAT 2032 / STAT 6046)

TUTORIAL EXERCISES WEEK 6

Question 1
The present value of two payments of $100 each to be made at the end of n years and 2n years is $100. If i=0.08, find n.

Question 2
This question mentions shares and dividends and is beyond the scope of what we have covered in lectures. A dividend is positive cash flow that the owner of the share receives from time to time. Ignoring the fact that this question includes shares and dividends it does cover equations of value.

Smith buys 100 shares of stock ABC at the same time Brown buys 100 shares of stock XYZ. Both stocks are bought for 10 per share. Smith receives a dividend of 0.80 per share, payable at the end of each year, for 10 years, at which time (just after receiving the 10th dividend) he sells his stock for 2 per share. Smith invests his dividends at annual rate 6%, and invests the proceeds of the sale of his stock at the same rate. Brown receives no dividends for the first 10 years, but starts receiving annual dividends of 0.40 per share at the end of 11 years. Brown also invests his dividends in an account earning 6%. If Brown sells his shares n years after purchase, what should be the sale price in order that his accumulated investment matches that of Smith, for each of n=15, 20 and 25?

Question 3
An investor is to pay $800 for a property. This property will return rent payments at the end of each year for 99 years. For the first 33 years the rental income is at a constant rate, increasing to double that rate for the next 33 years and triple the initial rate for the final 33 years. The property is expected to have a value of $250,000 at the end of the 99 years.

If the investor expects a return of 8% p.a. on the investment, calculate the value of the rent payable in the first year.

Question 4
Jones invests $1,000 at the end of each year for 15 years. If he knows that the present value of these payments is $8,400, find the effective annual interest rate, using Linear Interpolation, with $i_1 = 0.08$ and $i_2 = 0.09$.

Question 5

On January 1, 2013, Smith deposits 500,000 in an account earning a monthly effective rate of 1%, with interest credited on the last day of each month. Withdrawals are made on the first day of each month starting February 1, 2013, with an initial withdrawal of 1000. Each subsequent withdrawal is 1% larger than the previous one, continuing in this pattern for as long as possible.

    (a) When does the account finally become exhausted?

    (b) What is the amount of the last regular withdrawal?