MATH2090 – Mathematics of Finance

Assignment 2

Name:

MUN Number:

Due Date: Friday, 22 September

1. How much do I need to invest today, with an annual interest rate of 3.1% converted semi-annually, to have $50,000 in ten years time?

2. Let $a = a(t)$ be an accumulation function and suppose i_n and d_n are the effective interest and discount rates (respectively) for $a(t)$ in the n-th year. Prove the following statements.

   (a) $\dfrac{i_n}{1+i_n}\left(1+\dfrac{1}{2}i_n\right) = \dfrac{d_n}{1-d_n}\left(1-\dfrac{1}{2}d_n\right).$

   (b) $\displaystyle\sum_{k=1}^{n} i_k a(k-1) = a(n) - 1.$

3. Chris borrows $10,500 from a finance company at a nominal annual interest rate of 5.6% compounded monthly. If Chris makes debt payments of $3,500 at the end of each year how much does Chris owe three years after borrowing the money?

4. Heather invests $2,000 with *Friendly Finance* and then after three years she invests a further $2,500 with *Friendly*. If the *Friendly* interest rate is 3.9% per annum, at what time after Heather's initial deposit would a single investment of $4,500 give an equivalent investment to Heather's?

5. On April 1, 2000, John's bank account had a balance of $4,250; on April 1, 2005, $2000 was deposited into the account; and on April 1, 2009, $1,500 was withdrawn from the account. On April 1, 2016, John's account had a balance of $7,743.66, what is the effective annual interest rate that John received on his account?