MATH2090 – Mathematics of Finance

Assignment 3

Name:

MUN Number:

Due Date: 29 September, 2017

1. The account for an investment fund has the following value/activity:
   - A value of \$250,000 April 1, 2012.
   - On October 1, 2012, \$70,000 is withdrawn from the fund and immediately after this the fund has a balance of \$186,000.
   - On April 1, 2013, \$30,000 is deposited in the account and the balance immediately afterwards is \$224,000.
   - A balance of \$241,000 on April 1, 2014.

   (a) Find the time-weighted rate of return over the period covered by the two fiscal years 2012 and 2013 (i.e. April 1, 2012, to April 1, 2014.).

   (b) Find the dollar-weighted annual rate of return for the fund assuming compound interest (i.e. the effective annual interest rate – assume that October 1, 2012, gives exactly the midpoint of the fiscal year).

2. (a) Consider the geometric sequence, $\left\{9, -3, 1, -\frac{1}{3}, \frac{1}{9}, \ldots\right\}$.
   Find the n-th term of the sequence and and the sum of the first n terms.
   What is the sum to infinity of the sequence?

   (b) Prove that $a_{\overline{m+n}|} = a_{\overline{m}|} + \nu^m a_{\overline{n}|}$, where $\nu = \dfrac{1}{1+i}$ and i is the interest rate.

   (c) Prove that $\dfrac{1}{a_{\overline{n}|}} = \dfrac{1}{s_{\overline{n}|}} + i$

3. Allan takes out a \$10,500 loan to be repaid in 12 annual equal payments with an interest rate of 4.5%. What is the amount of the annual repayments?

4. Re-do Question 3 with equal monthly repayments required over the 12 year period, to find the monthly payment required.

5. An annuity pays \$45,000 per annum for 25 years. If the interest rate is 2.17% answer the following questions.

   (a) The value of the annuity one year before the first payment.

   (b) The value of the annuity one year after the last payment.

   (c) The value of the annuity at the time of the tenth payment.

   (d) The number of years the annuity would have to run in order that the current present value of the annuity be doubled.